

December, 1947

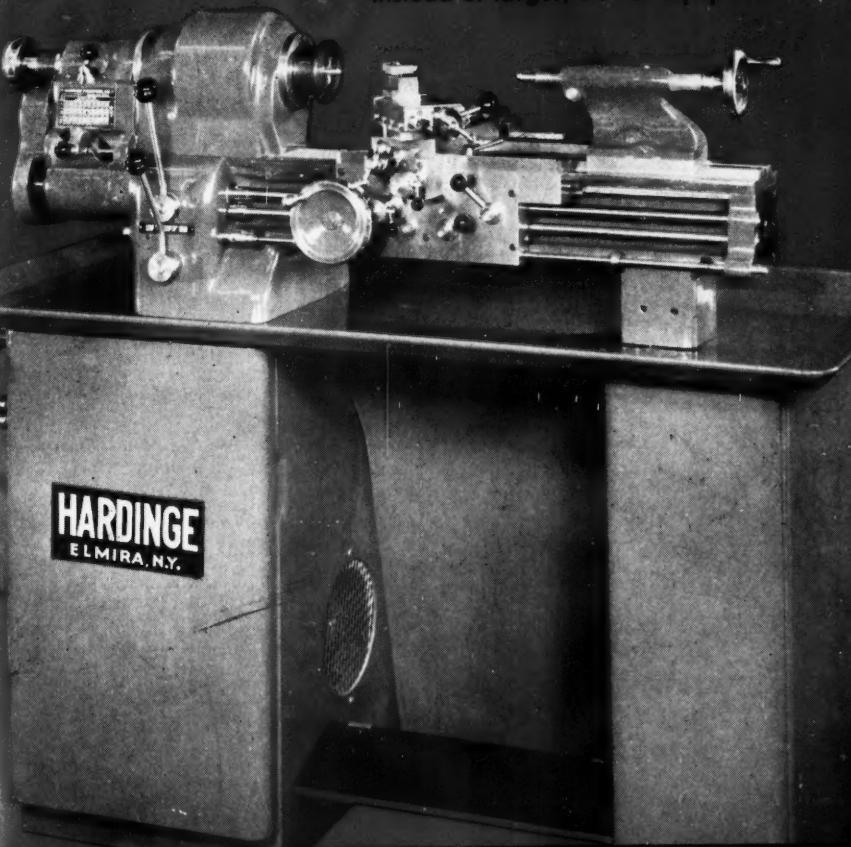
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Page 5

MODERN Machine Shop

HARDINGE
ELMIRA, N.Y.

HIGH SPEED PRECISION TOOL ROOM LATHE

Save expensive tool room labor by using
this high speed machine, within its capacity,
instead of larger, slower equipment.



"PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE"

Improve Productivity

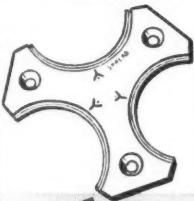
TYPICAL EXAMPLES OF GORTON MANUAL AND AUTOMATIC Tracer Control



High precision production of dies and molds like this injection mold are produced from simple enlarged master patterns without the need of highly skilled operators.



Completely automatic profile milling similar to the profiling of these impeller blades is possible on a standard Gorton with special tooling.



Gorton Tracer Control permits multiple milling, counter-boring and engraving operations like the 7 operations performed on this indicator plate from one simple master pattern.



Let us determine for you whether or not Gorton Tracer Control can improve your product and plant productivity. Send us a complete description and prints of one of your jobs. We will furnish a production estimate of the same job toolled on a Gorton—no obligation.

Productivity



GORTON Tracer Controlled MILLING...

is our term for super-speed precision milling, engraving, electrical etching or other metal removal operations where a simple master pattern is used. The increased speed and greater accuracy made possible by this method offer many opportunities for improving both product and productivity. Many Gorton users report that their machines paid for themselves in a remarkably short period.

LET GORTON PRE-DETERMINE RESULTS FOR YOU

Find out for yourself what Gorton can do for you—before you buy. Make use of Gorton Engineering Service (see Engineering Service offer at lower left). Also, mail us the coupon below and get your free copy of Bulletin No. 1655, containing information on the complete line of Gorton Tracer Controlled Machines.



PLEASE SEND WITHOUT OBLIGATION
Bulletin No. 1655-1101-13

Name.....

Company.....

Position.....

Address.....

City..... Zone..... State.....

GEORGE GORTON MACHINE CO.
Tracer Controlled Milling

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DETROIT

COMPARE:

A



B

A Profilograph trace, good commercially ground finish. 5000x vertical, 30 horizontal.

B Profilograph trace, Timken finish. 5000x vertical, 30x horizontal.

Answers the question—"How rough is smooth?"

ONE of the reasons Timken tapered roller bearings perform with such frictionless, wear-free ease is the amazingly smooth surface finish on the rolls and races—the finest known to modern bearing science.

Now, when you talk about finishes like this, you're talking about surface irregularities of only a few millionths of an inch—irregularities which are impossible to detect by any ordinary means. So, when Timken first began to develop this finish, one of the biggest obstacles was the absence of an accurate method of measuring the roughness of an apparently smooth surface.

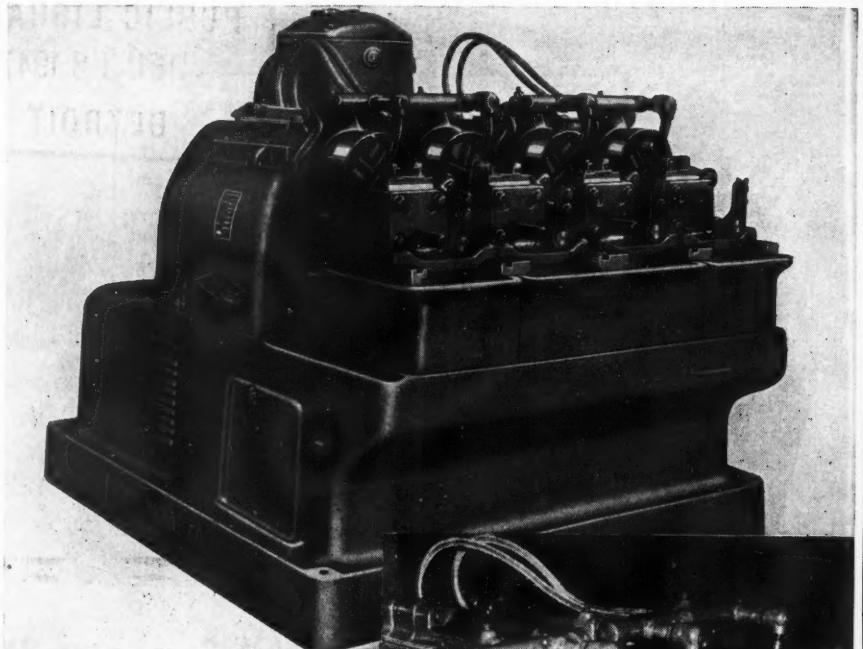
The profilograph pictured above was the answer. Developed by Timken in 1928 and steadily improved since then, the profilograph determines surface irregularities to

within one-millionth of an inch. Equipped with this measuring stick, Timken engineers were able to develop new finishing methods and machines, which have resulted in the microscopic surface accuracy of the Timken bearings you use today.

Look to Timken bearings for 1. advanced design; 2. precision manufacture; 3. rigid quality control; 4. special analysis steels. The Timken Roller Bearing Company, Canton 6, Ohio.

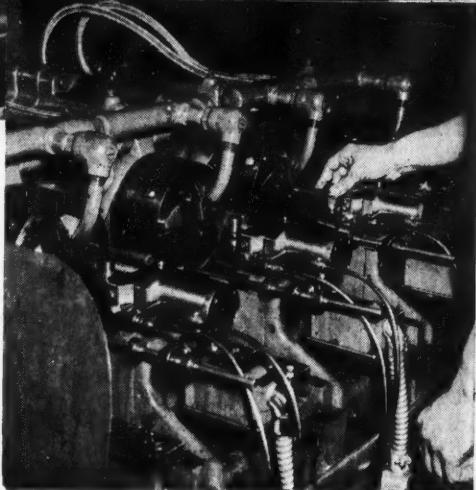


NOT JUST A BALL ○ NOT JUST A ROLLER ○ THE TIMKEN TAPERED ROLLER ○ BEARING TAKES RADIAL ○ AND THRUST ○ LOADS OR ANY COMBINATION ○



LANDIS 4-SPINDLE SEMI-AUTOMATIC THREADING MACHINE

The illustration shows a $\frac{3}{8}$ " diameter 24 pitch thread $2\frac{1}{8}$ " long being cut on bar stock at approximately 400 pieces (800 threads) per hour, a 40% reduction over previous methods. Average production on this machine ranges from 500 to 2000 pieces per hr.



LANDIS
MACHINE COMPANY
WAYNESBORO, PA., U.S.A.

Outstanding Advantages are:

- Low Labor Cost Per Piece.
- High Production at Low Threading Speeds.
- Quick Set-Ups.
- Flexibility for all Diameters and for Special Threading Operations.
- Elimination of Side Shave at Start of Thread.
- Thread Concentricity.

WRITE FOR BULLETIN NO. E-88

NEW SMALL HEALD BORE-MATICS

**Single or double end high-precision
machines for small work**

SMALL IN SIZE and simple in design, these new Bore-Matics are ideally suited to both large and small shops. Toolled for one or several parts, they bore, face, turn, chamfer, groove or fly cut.

Outstanding new features are: knee-hole construction, capacity for two spindles at either end, extremely fast operating cycles, uniform speeds and feeds, complete control of heat and vibration, leak-proof hydraulic system. Nearest Heald branch office will gladly give you complete details.



Write for free bulletin on these new
Heald 121 and 122 Bore-Matics.

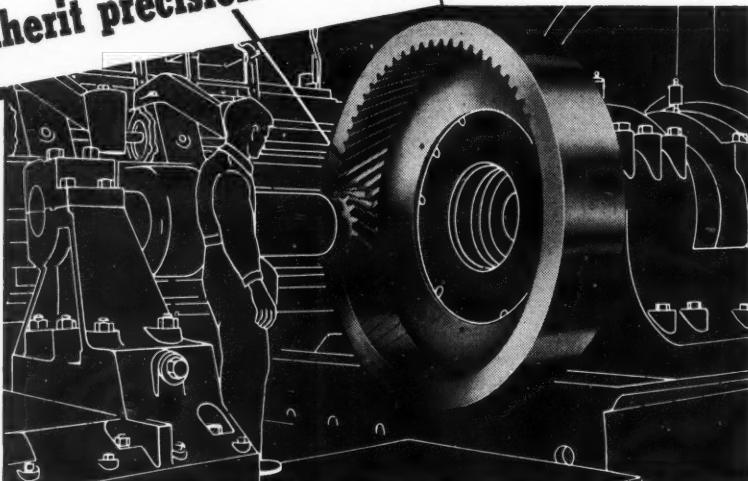


THE HEALD MACHINE COMPANY, Worcester 6, Mass.

Branch Offices in Chicago • Cleveland • Dayton • Detroit • Indianapolis • Lansing • New York

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ds.
pecial
read.
E - 88

Here's where
Farrel INTERNAL GEARS
inherit precision



The precision in Farrel internal gears is passed on from the machine on which these gears are made—the Farrel-Sykes Gear Generator.

The initial precision built into this Farrel machine plus the inherent accuracy of its operating principle—"precision generation"—gives the gears accurate tooth contour and tooth spacing. Because of this you can be sure that when you buy internal gears from Farrel, they will operate smoothly, quietly and efficiently over a long service life.

Precision generated internal gears with either spur or single helical teeth are available in any size up to approximately 16-feet diameter, 12-inch face, 1½ DP.

Internal gears frequently meet design and operating conditions better than other types and their availability in large sizes has extended their advantages to many applications where size limitations formerly prevented their use.

Next time you need internal gears or gear engineering help call on Farrel.

FB-390

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344 VULCAN STREET • BUFFALO 7, N. Y.

*Plants: Ansonia and Derby, Conn.,
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Farrel-Birmingham

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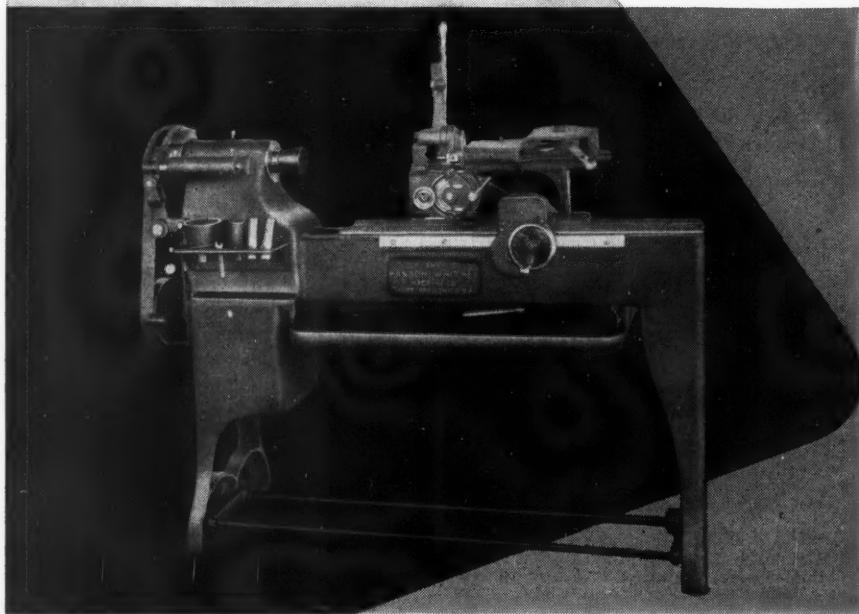
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CORRECT CENTERING...

is an IMPORTANT OPERATION



The Hanson-Whitney Rapid Precision Centering Machine has solved the problem of accurate, rapid centering of bright rolled stock, or parts produced on bar machines where centers are required for a succeeding operation. The correct principle of rotating work in center-rest is utilized. Center is drilled and shaved in sep-

arate operations. Center-rest is quick-acting roller type, instantly adjustable for diameter through observation dial. The unique, quick-acting work chucks, in conjunction with foot-treadle operation, enable varying diameters to be handled with the utmost speed and accuracy.

Write for descriptive folder today.

Hanson Whitney

MACHINERY COMPANY
HARTFORD • CONNECTICUT

GISHOLT'S

hardened steel
bed ways are one
of the greatest
contributions
ever made to
precision machining
on a turret lathe

SHOUT MACHINE COMPANY

THE GISHOLT ROUND TABLE
represents the collective experience
of specialists in the machining,
surface-finishing, and balancing
of round and partly round parts.
Your problems are welcomed here.



GISHOLT TURRET LATHES
are the precision tools that all precision
machining, grinding, and
clamping surfaces are built
on. Rockwell C-quality
material, advanced
engineering, unique
designs, make the
Gisholt the best.



Turret lathes • automatic lathes • superfinishers • balancers • special machines

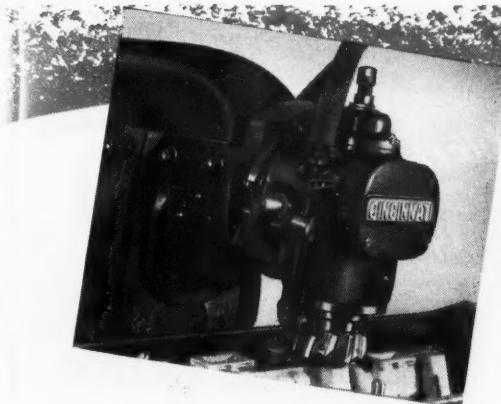
Milling a dovetail. The Heavy Vertical Attachment transmits plenty of power for operations like this.

AN EXTRA HEAD

solves a lot
of machining
problems

Where the attachment is often removed and remounted on the same machine, auxiliary crane equipment will be a timesaver

Right: Milling a worm. A CINCINNATI Dividing Head is part of the setup.



Milling an aluminum part. Note the large diameter cutter mounted in the Heavy Vertical Milling Attachment.



What's the first thing you think about when you schedule a new milling operation? Chances are, it's horizontal vs. vertical machines. And if the choice is definitely vertical, can your present equipment handle the job? The absence or lack of sufficient vertical milling machine capacity need not be a stumbling block. With CINCINNATI Horizontal Millers in your shop, you can mount a Heavy Vertical Milling Attachment on machine and go right ahead.

It has the ruggedness to take a heavy cut

Spindle speed ratio 1 : 1

No. 50 standard spindle nose

And: An additional advantage not found in most vertical head milling machines...the spindle unit can be swiveled 45° right or left

These illustrations give you an idea of the usefulness of CINCINNATI Heavy Vertical Milling Attachments. More information may be obtained by writing for bulletin M-960-2.



Milling an angular face on a crankshaft.

THE CINCINNATI MILLING MACHINE CO.

CINCINNATI, OHIO, U. S. A.

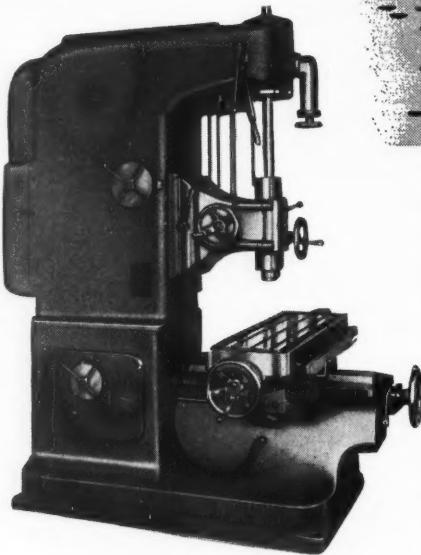
MILLING MACHINES • BROACHING MACHINES • CUTTER SHARPENING MACHINES

Fast, Accurate Production
More Economically

with the New

No. 50

PRECISION BORING and VERTICAL MILLING MACHINE



The unusual production economy of the new Knight No. 50 is achieved by combining, in a single solid base machine of exceptional range, all the features required for both precision boring and vertical milling. The elimination of time-wasting extra set-ups and transfers of work save costly labor and make possible much higher output at far lower costs. With a working capacity of greater range than other machines of comparable size, there is also power to spare in the rugged No. 50 for easily and speedily handling the toughest jobs in any shop.

- 16 Spindle speeds from 40 to 2000 r.p.m.
- 9 Spindle feed from .005" to .010"
- 100" per minute table traverse, both directions
- 16 Table feeds, 5/16" to 20" per minute
- 7 1/2 H.P. drive

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Catalog Information*

W.B.KNIGHT

MACHINERY COMPANY



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For Spur,
Helical and
Herringbone,
External and
Internal Gears,
Cluster Gears,
Splines
and other
Profiles

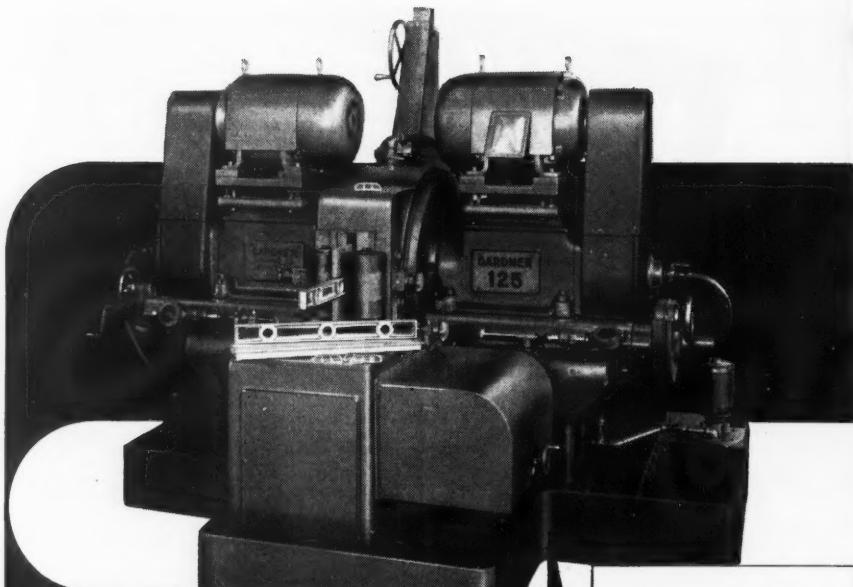
This heavy-duty machine is of extremely rigid construction, permitting the taking of heavy cuts at high speed—It is easy to set up and operate.

★ Every gear shop will want complete information on this new Fellows 36" Gear Shaper.

Fellows

The Fellows Gear Shaper Co., Head Office and Export Dept., Springfield, Vermont. Branch Offices: 616 Fisher Building, Detroit 2, 640 West Town Office Building, Chicago 12, 7706 Empire State Building, New York 1.

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city of
com-
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easily
shop.



Gardner **DOUBLE** Grinders
DOUBLE Production
on dozens of
parallel-surface parts

● The practical way to lower high labor costs, is to increase production. Gardner DOUBLE Grinding does just that, on dozens of parallel-surface parts—such as the aluminum and cast iron levels being ground on the Gardner No. 125-26" DOUBLE Grinder shown above.

You can hold down your grinding costs, while keeping within closest tolerances, on many similar jobs.

Send for Latest Bulletin on Gardner DOUBLE Grinding!

GARDNER - GRIND
YOUR Flat SURFACES

GARDNER MACHINE COMPANY
428 East Gardner Street • • • Beloit, Wisconsin, U.S.A.

WORK DATA

Part Levels

Material Aluminum and
cast iron

Operation Grind sides
top and bottom

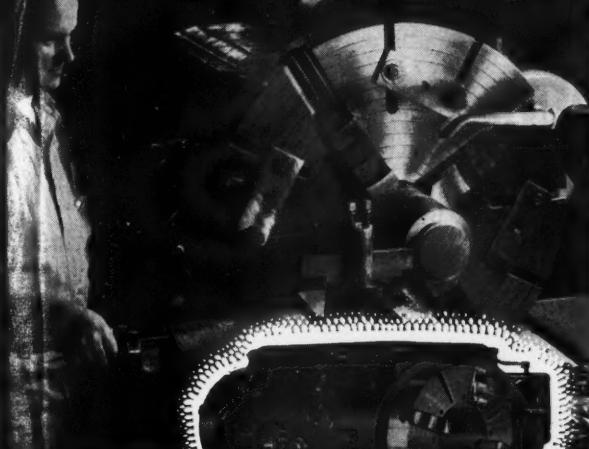
Tolerances .001" to .002" for
parallelism, .004" for
uniformity

Stock Removal Top and
bottom = .035" overall
sides = .030" first cut;
.005" second cut.

Production 10' to 30' per min.
per cut.

Machine #125-26" Gardner
Grinder

Fixture "Feed through"
fixture with rubber
trolls.



"I can sure
do a BETTER
JOB on a
HYDRATROL
LATHE!"

You'll
do it
Better!... on a



HYDRATROL LATHE

Large Hollow Spindle Type

LOOK around your shop—you may find a number of machining jobs which very likely could be done better on a Large Hollow Spindle Type of HYDRATROL LATHE. Done faster—more easily—more accurately—more economically—on the lathe noted for its precision, speed, endurance, long life, and absence of mechanical troubles.

Send us prints for a specific, time-and-money-saving recommendation.

5 Sizes—18" to 36"

Small.....18" up to 7 $\frac{1}{2}$ " Hole
Medium....24" up to 12 $\frac{1}{2}$ " Hole
Large.....27" up to 13 $\frac{1}{2}$ " Hole
Large.....30" up to 14 $\frac{1}{2}$ " Hole
Large.....36" up to 16 $\frac{1}{2}$ " Hole

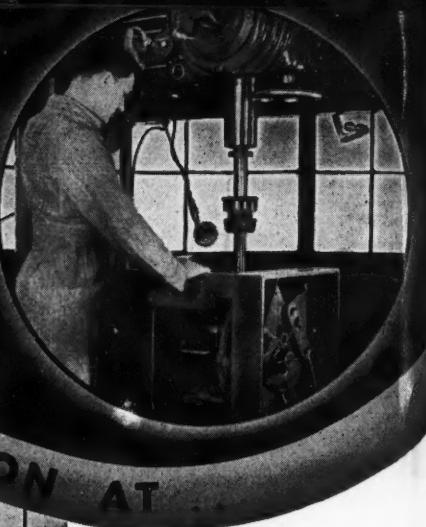
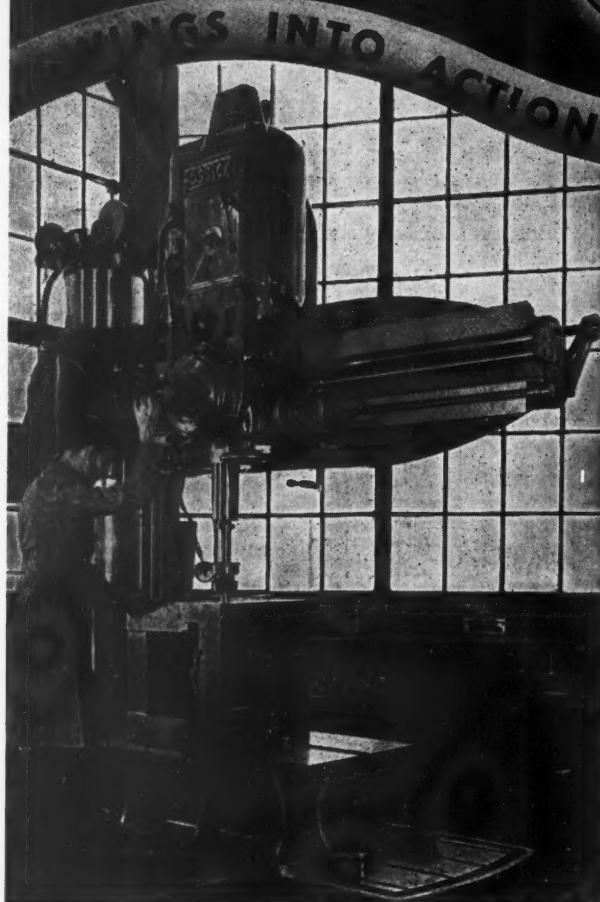
Standard Type Lathes, 16" to 36"

Standard Type HEAVY DUTY Lathes,
20" to 36"

Lehmann MACHINE COMPANY

HOUTEAU AT GRAND... ST. LOUIS 3, MISSOURI

FOSDICK RADIAL



EX-CELL-O
CORPORATION

The part being drilled is only one of many parts of various Ex-Cell-O machines that are drilled, tapped or bored on the sturdy, time and labor saving **FOSDICK RADIAL DRILL**.

A box jig holds the work while drilling, reaming or tapping various diameter holes from two or more sides.

Note the convenience and time-saving features of centralized control in the head. A wide range of feed and speed changes, as well as hand feed, are instantly available.

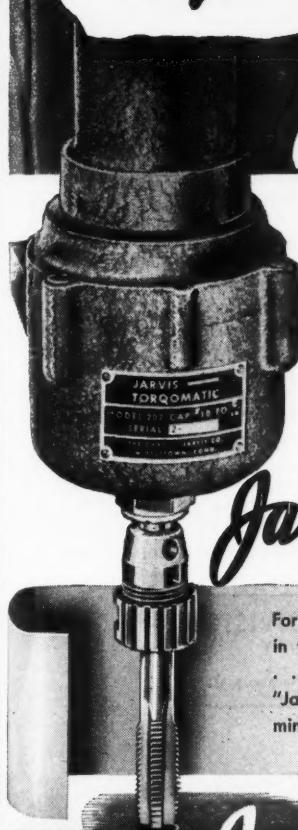
If your work can be handled on a Radial, it can be done on a Fosdick. Write for Bulletin MSR for full particulars.

FOSDICK

MACHINE TOOL CO.
CINCINNATI 23, OHIO

Tops in Tapping

Jarvis TORQOMATIC



The new torque-driven tapper is the most modern, efficient and productive tool of its kind on the market. Performance in your shop will confirm this fact. The Torqomatic is ultra-sensitive, will tap from soap to nickel steel with finger tip pressure. It increases number of tapped holes per hour, adds life to taps and is a new pleasure for the operator. Available in standard and built-in models.

Write for fully descriptive Catalog TMT-1. A Jarvis representative will welcome the opportunity to demonstrate the Torqomatic.

Jarvis-Dowding TAPS

For maximum performance under tapping conditions prevailing in your shop, make your next tap order read "Jarvis-Dowding" . . . custom finished taps, designed to meet your demands. "Jarvis-Dowding" Taps cut more threads with less power, require minimum sharpening and provide greater dependability on the job.

Write for Bulletin JD-101 for more details.

Jarvis POWER TOOLS

THE CHARLES L. JARVIS CO., MIDDLETON IN CONNECTICUT

Rotary Files • Flexible Shaft Machines • Taps and Dies
Quick Change Collets and Chucks • Tapping Attachments

CRACK DOWN ON

**with the high-production flexibility
of the Delta* 17" Drill Press**

Versatile Delta Drill Presses give you low-cost, trouble-free capacity for a wide variety of operations and set-ups

You can use a low-cost Delta 17" Drill Press (single or multiple spindles) in dozens of operations in almost any plant. And wherever you use a Delta, *you can count on increased production—at lower costs!* That has been the experience of The Dumore Company, Racine, Wisconsin, manufacturer of precision tools and grinders—and it has been the experience of hundreds of other plants as well.

At Dumore, nearly 100 Delta Drill Presses are used for drilling, tapping, burring, spot-facing, and a variety of other jobs. Dumore's ingenious Delta set-ups suggest ways *you can streamline your plant operations for lower costs.*

The Delta 17" Drill Press is engineered for accurate, fast production, and long,

dependable service. Outstanding design and construction features give you exceptional value: Extremely accurate spindle with an exceptionally long bearing surface of spline to eliminate wear and retain original accuracy . . . pulley mounted on lubricated-for-life ball bearings . . . head- and table-raising mechanisms equipped with ball bearings . . . close-tolerance table surfaces . . . heavy construction throughout, with advanced design for correct weight distribution.

Send for a free copy of Bulletin A-17 today. Use the coupon below. Or ask your Delta distributor for further details on Delta 17" Drill Presses. Your distributor is listed under "Tools" in the classified section of your telephone directory.



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ROCKWELL MANUFACTURING COMPANY

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Machine

Abrasive
Finishing
Machines



Grinders



Band Saws

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602NE, Vienna Ave., Milwaukee 1, Wisconsin

Please send me Bulletin No. A-17
on Delta 17" Drill Presses.

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Position.....
Company.....
Address.....
City..... (.....) State.....

COSTS



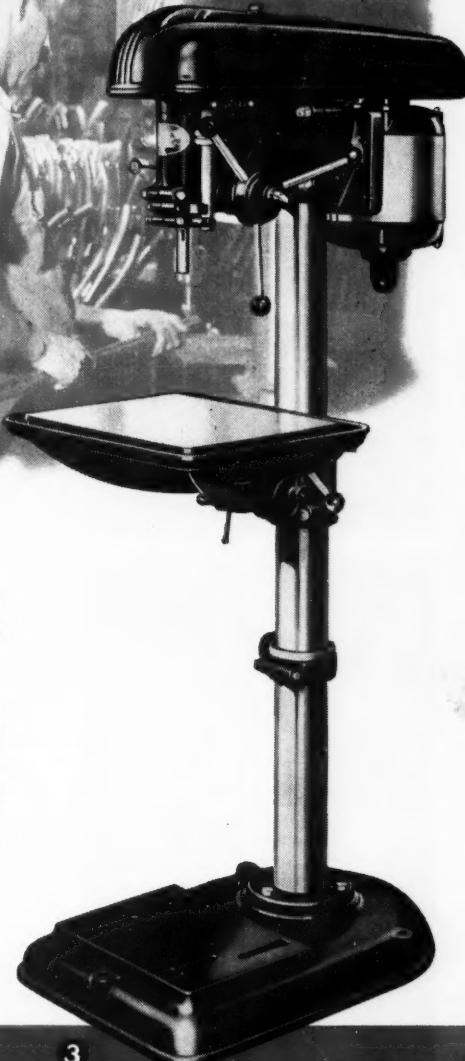
Delta 17" Drill Press — available as single-spindle floor or bench-type, or 2, 3, 4, 5, 6 and 8-spindle press, with one-piece or sectional tables.

Capacity: $\frac{3}{4}$ " in cast iron.

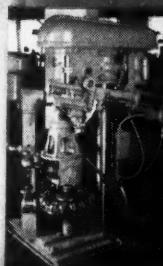
Machines include: table-raising mechanism, streamlined belt-guard, built-in depth gage, depth scale on spindle return spring housing.

Spindles: No. 2 Morse Taper Spindle, or $\frac{1}{2}$ " Jacobs Chuck Spindle.

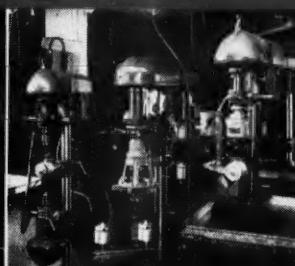
Motor: Choice of $\frac{1}{2}$, $\frac{3}{4}$, or 1 HP for light, medium, or heavy-duty work.



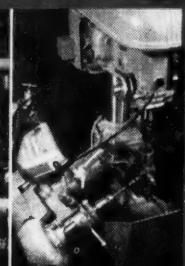
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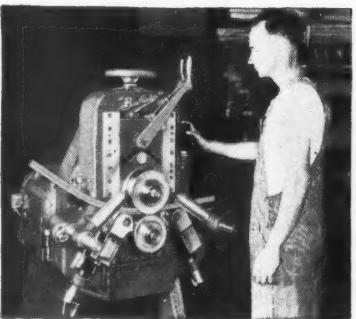
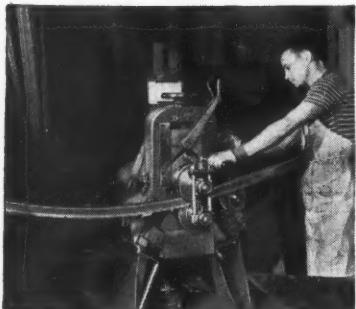


1. Dumore increased production on bearing-cap wrench holes 500% with this Delta Drill Press and special pneumatic rotary-table fixture.

2. This Delta 17" Drill Press, equipped with Multi-Drill Head and pneumatic feed, increased production 300% in drilling 6 vent-holes in motor housing.

3. These two Delta Drill Presses (mounted on the same stand) increased production 400% on this drilling and spot-facing job on a motor case.

Put BENDING



on this
**PAYING
BASIS**

Bending of light segments into arcs, spirals or circles NEED NOT BE EXPENSIVE! More and more manufacturers are discovering the BEST way to get bending costs down—and that is with "Buffalo" OA Bending Rolls.

With an OA, you can take angles, squares, rounds and structural shapes—and bend them accurately into scores of useful curved products—with a speed you won't believe until you have actually seen it! DON'T LET BENDING PUT A "CRIMP" INTO YOUR PRODUCTION—investigate what "Buffalo" can do for you—write now for all data on "Buffalo" Benders!

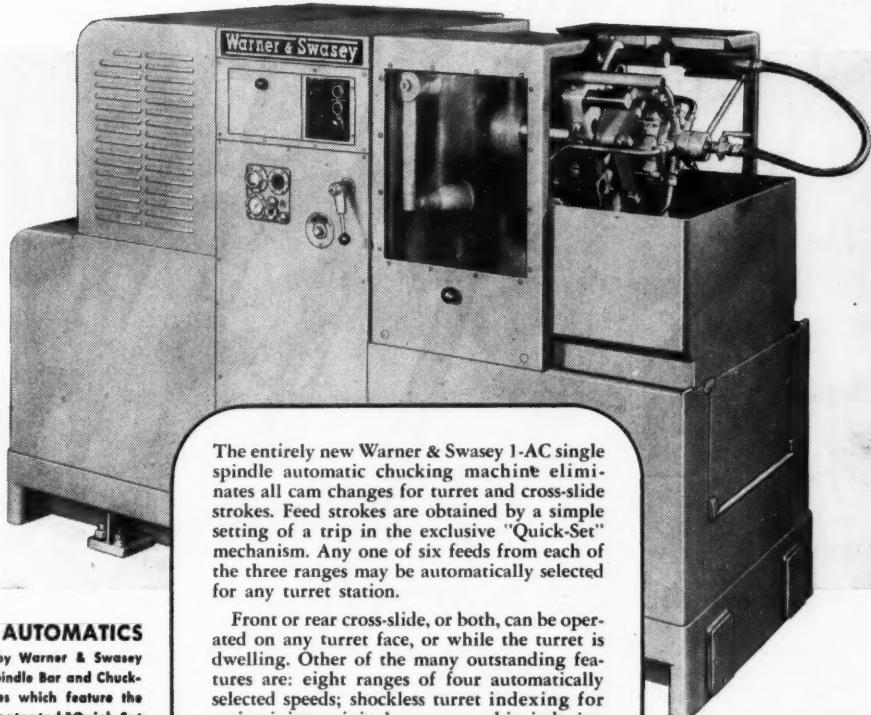
BUFFALO FORGE COMPANY

388 BROADWAY BUFFALO, N. Y.
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

"*Buffalo*"
**BENDING
ROLLS**

No Cam Changes on this New Single Spindle Automatic

by **WARNER & SWASEY**



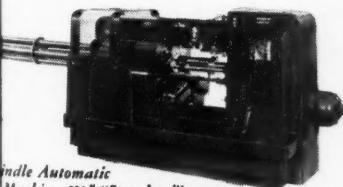
The entirely new Warner & Swasey 1-AC single spindle automatic chucking machine eliminates all cam changes for turret and cross-slide strokes. Feed strokes are obtained by a simple setting of a trip in the exclusive "Quick-Set" mechanism. Any one of six feeds from each of the three ranges may be automatically selected for any turret station.

Front or rear cross-slide, or both, can be operated on any turret face, or while the turret is dwelling. Other of the many outstanding features are: eight ranges of four automatically selected speeds; shockless turret indexing for maintaining original accuracy; skip-indexing of turret to eliminate unnecessary approach strokes; maximum rigidity, simplicity of setup, and many new operator conveniences.

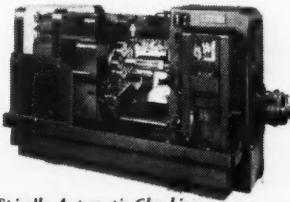
8" or 10" Chuck • 6" Turning Length

HER AUTOMATICS

built by Warner & Swasey
are 5 spindle Bar and Chuck-
Machines which feature the
unique, patented "Quick-Set"
mechanism. This eliminates need
of cams. Work stroke settings are
made by quick, simple adjustment
in graduated quadrant. The fast
overtravel makes it practical and
able to use Warner & Swasey
machines for small, medium
and long runs.



Spindle Automatic
Machine, 1½" "Standard"
capacity; 2½" "oversized" capacity.



5 Spindle Automatic Chucking
Machine, 6" Swing.

To get full, up to the minute information on the latest developments in Warner & Swasey

TURRET LATHES
AUTOMATIC CHUCKING AND BAR MACHINES
PRECISION TAPPING AND THREADING MACHINES
CHUCKS AND TURNING TOOLS AND ACCESSORIES

call in the Warner & Swasey field representative or write Warner & Swasey, Cleveland.

WARNER & SWASEY
Machine Tools
Cleveland

YOU CAN MACHINE IT BETTER, FASTER, FOR LESS...WITH A WARNER & SWASEY



Phillips, Frearson, Clutch
Head, Slotted, Socket or
Hex Head Screws —

—it's all the same to Apex

No matter what make of electric, air or spiral driver you use Apex has the right bit for driving the screws named above. Apex bit holders do a big job and keep tool inventories to a minimum. You get the bit holders you need for *your* drivers—then simply order new tips as needed and discard the old ones.

For hex head screws from $7/32''$ through $9/16''$ hex, use Apex double-life sockets. When one end of the socket becomes worn, turn it end for end on the shank and get an *extra* service life.

Write for Catalog 20,
which gives all the details.

APEX

Screwdriver Bits

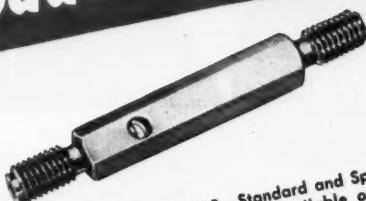
THE APEX MACHINE & TOOL CO., 1028 S. Patterson Blvd., Dayton 2, Ohio

Safety Friction Tapping Chucks; Quick Change and Positive Drive Drill Chucks; Vertical Float Tapping Chucks; Parallel Floating Tool Holders; Power Bits for Phillips, Slotted Head, Frearson and Clutch Head Screws; Hand Drivers for Phillips and Clutch Head Screws; Aircraft, Industrial Universal Joints; Sockets and Universal Joint Socket Wrenches,

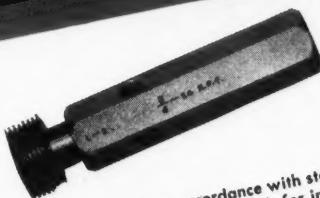
Lower your Production Costs:



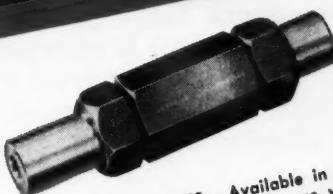
THREAD RING GAGES—Standard and Special Pitches—Precision Lapped—All available out of stock.



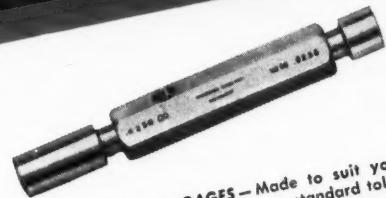
THREAD PLUG GAGES—Standard and Special Pitches—Precision Lapped—All available out of stock.



PIPE GAGES—Made in accordance with standard specifications—Complete stock for immediate delivery.



DOUBLE DUTY GAGES—Available in size range .060 to 1.000—Reverse gage when worn in simple collet type handle.



CYLINDRICAL PLUG GAGES—Made to suit your requirements—Precision Lapped to standard tolerances.



CYLINDRICAL RING GAGES—Master and Working Gages made to order—Precision Lapped—All sizes.

Quality control is the most important function and responsibility of management. Insure your product against "out of tolerance errors" by becoming more gage conscious. All our gages are made to A.G.D. standards, precision lapped and processed for rigid Size Control and Size Stability. Chrome plate can be supplied if desired.

When the occasion demands the finest and consistently the finest—specify SCHRILLO. Special tools and gages made to your specifications. Consult our local distributor for prompt and courteous service.

ATTENTION PLEASE:

For production tapping of heat treated high tensile alloy steel try our new "ARMOURCLAD" taps, at no additional cost.



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Aero tool Engineering Company

Avey's
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features

add up to TOP PRODUCTION

Six speed changes on the AVEY BMA-6 are made through selective, sliding gears. This automotive type of gear shift is controlled by a single lever at front of machine. Provides versatility and effective operation.



CAPACITY
Cast-Iron

52 BMA 6 - $\frac{1}{2}$ "
53 BMA 6 - $\frac{1}{4}$ "
Single to six spindle machines, equipped with hand feed, power feed or reversing motor tapping.



plus

FINAL SPINDLE DRIVE — VEE BELTS

Vee belt used on final drive from gear box to spindle. Increases speed and sensitivity in drilling. Carries full horse power from motor to job.

plus

STANDARD MOTOR — EACH SPINDLE

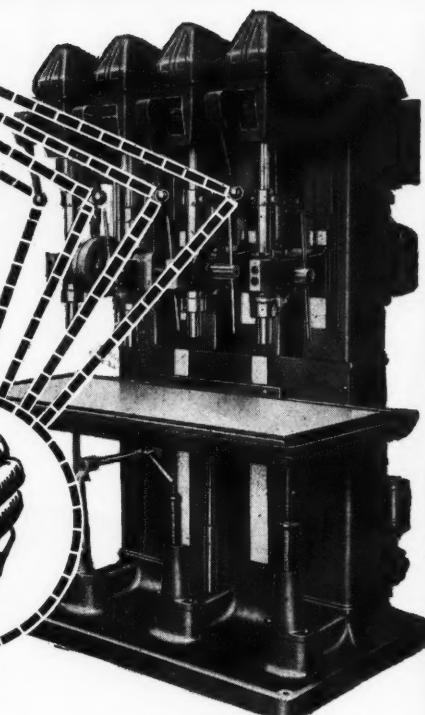
Each spindle of AVEY BMA-6 individually motor-driven by standard frame constant speed motor. Fast-mounted motor easily interchanged or replaced. Standard motors can be stocked.

plus

SPEEDS OBTAINED — SLIDING GEARS

Selective, sliding gears of AVEY BMA-6 change speeds quickly and easily. Each gear is manufactured and finished by accurate, modern process, shaved, hardened and lapped. Insures smooth operation and long performance.

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AVEY TYPE BMA-6

Four Spindle—12" Overhang

1st spindle—Avey-matic feed

2nd spindle—Plain power feed

3rd spindle—Hand Feed

4th spindle—Tapping (reversing motor)

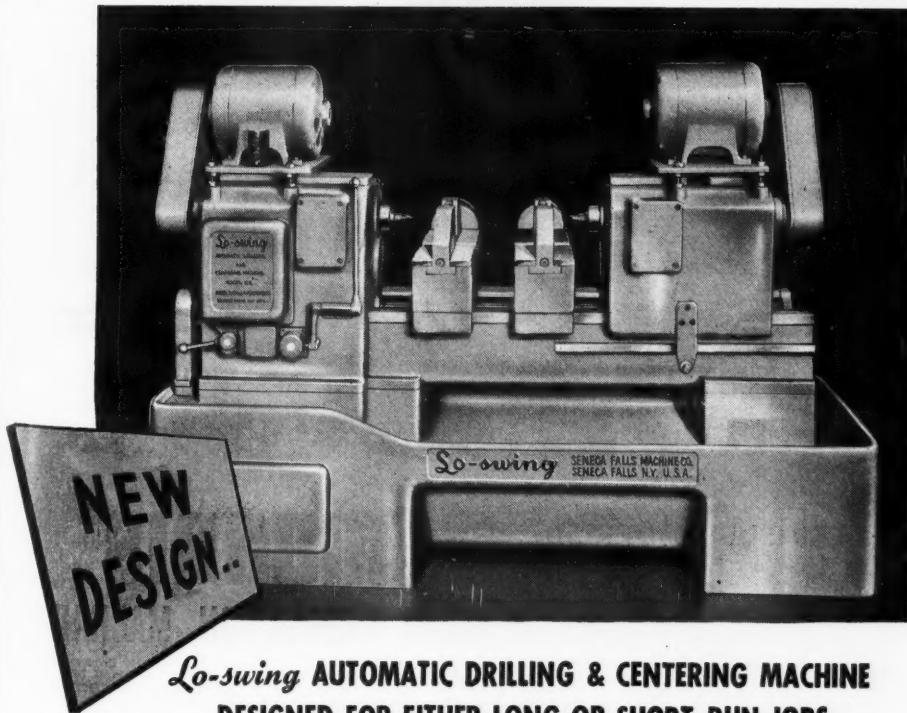
**AVEY DRILLING MACHINE CO.,
CINCINNATI 1, OHIO**

Gentlemen: Please send without obligation your new Bulletin 647.

COMPANY _____
ADDRESS _____
NAME _____

MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE Lo-swing PEOPLE" SENECA FALLS, NEW YORK



Lo-swing AUTOMATIC DRILLING & CENTERING MACHINE DESIGNED FOR EITHER LONG OR SHORT-RUN JOBS

Since its introduction at the Machine Tool Show, the Lo-swing Model "CS" Automatic Drilling and Centering Machine has demonstrated its versatility as an economical producer on both mass production and short-run jobs. Because of its quick change-over features, speeds and feeds are quickly changed and its built-in, adjustable rapid traverse mechanism reduces automatic cycle time to a strict minimum.

Two independent, motor-driven heads permit operation at correct spindle speeds for each head when different sized drills or combination countersinks are used. The drilling spindles are cam operated and positive in action. The cams will operate for any depth of cut within the capacity of the machine and do not require changing. The rapid traverse mechanism for both centering

heads is controlled by cams which are pre-set to a graduated dial, doing away with inefficient "set and try" methods.

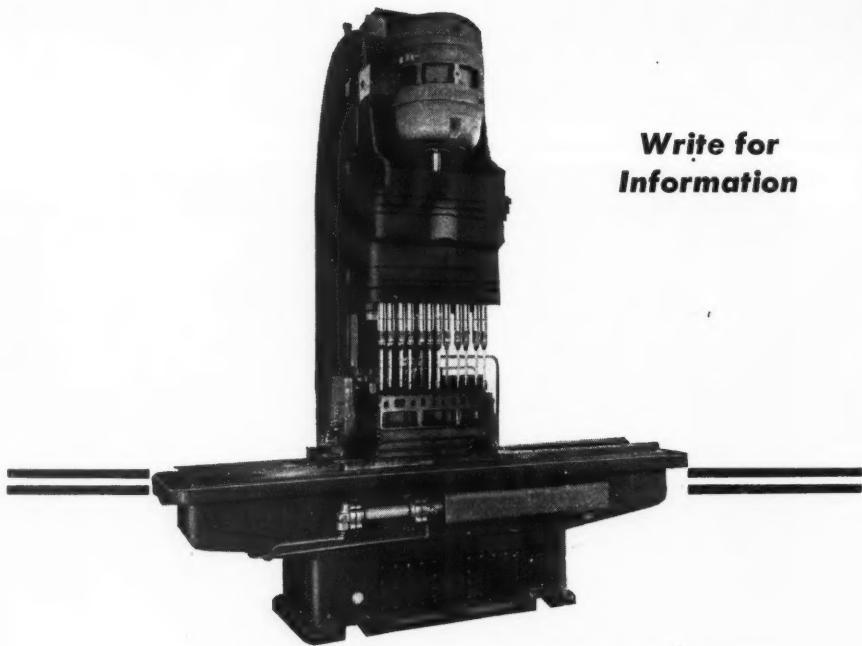
Standard, quick-acting, equalizing, air operated vises are available and may be arranged to operate singly or in pairs. Ample distance from the bed to the spindle provides sufficient room for special work-holding fixtures which are available as extra equipment. Electric motors are the standard foot mounting type and may be furnished in sizes from 1 to 3 H.P.

The Model "CS" Automatic Centering Machine is manufactured in four standard sizes, 18", 42", 66" and 90" between drills. Seneca Falls engineers will welcome an opportunity to assist in the solution of your centering problems. Write for full information on this new cost-cutting equipment.

SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

PRODUCTION COSTS ARE LOWER WITH Lo-swing

**Write for
Information**



CONSULT MORRIS

- For high production work
- For engineering "Know How"
- For facilities to design,
develop and manufacture
highly efficient machines
for mass production.

MORRIS
HIGH PRODUCTION MACHINES

The machine above is used for line reaming valve port, valve guide bushing hole and valve poppet hole. The head starts its feed at a high speed for the small diameter reaming and automatically changes to slow speed for reaming the valve port.

It is equipped with three position hydraulically operated come-along device.



The MORRIS Machine Tool Co.
CINCINNATI 3, OHIO

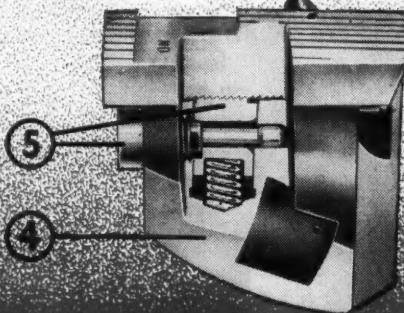
Five Good Reasons Why...

**JONES &
LAMSON**

Ground Thread

**TANGENT CHASER
DIE HEADS**

PRODUCE BETTER THREADS at LOWER COST!



THREAD QUALITY

1. They are hardened and ground throughout. The body is lapped on the face and in the dovetail slots. Chaser holder bearing surfaces are lapped into the body.
2. Chasers are guaranteed to produce threads of Class III fit.
3. Exact helix angle is ground into the chasers after hardening.

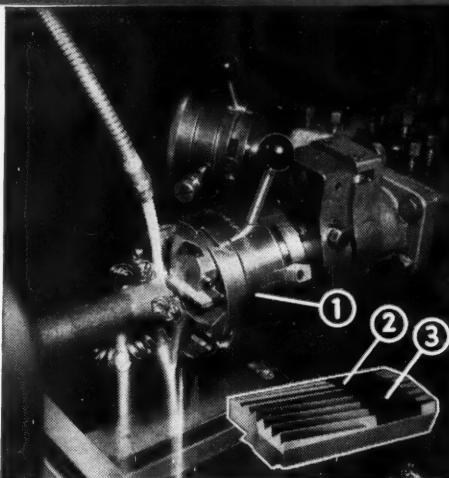
ECONOMY

4. Dies are universal, therefore investment in chaser holders is reduced to a minimum and change-over and set-up are speeded.
5. Chasers are set quickly and easily.

If you are interested in greater economy and better quality in threading, fill in the coupon and we will send you our valuable handbook "Thread Elements and Formulas", together with complete information about our Die Heads.

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MACHINE COMPANY
Springfield, Vermont, U. S. A.


Manufacturer of: Universal Turret Lathes, Fay Automatic Lathes, Automatic Double-End Milling and Centering Machines, Automatic Thread Grinders, Optical Comparators, Automatic Opening Threading Dies and Chasers, Ground Thread Flat Rolling Dies.



**JONES & LAMSON MACHINE COMPANY
DEPT. 710A, SPRINGFIELD, VERMONT, U.S.A.**

Please send me your handbook "Thread Elements & Formulas", and complete information about your Threading Dies.

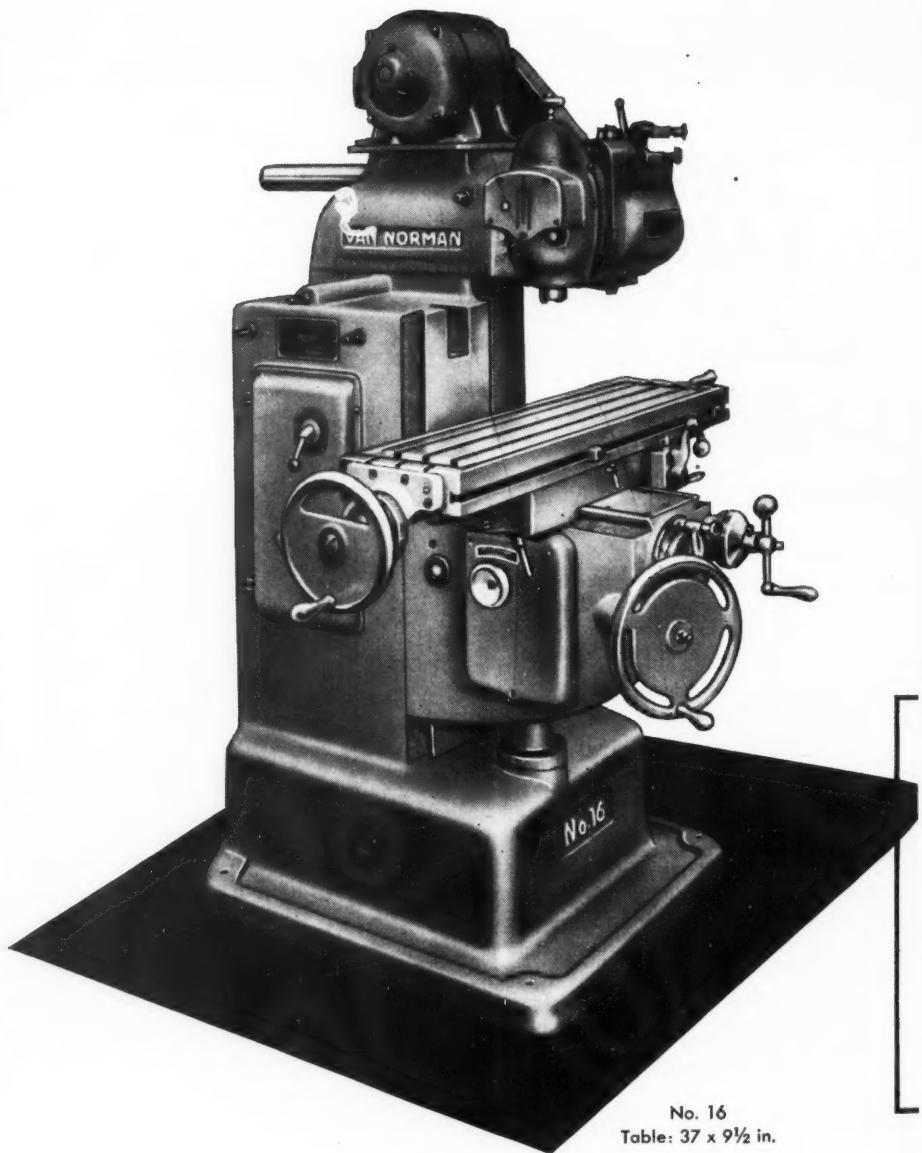
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C O U P O N



No. 16
Table: 37 x 9 1/2 in.

"It pays to Van Normanize"

THE NEW VAN NORMAN NO. 16 RAM TYPE MILLING MACHINE

FEATURING THE ADJUSTABLE CUTTERHEAD, MOVABLE RAM AND BUILT-IN CONTROLS

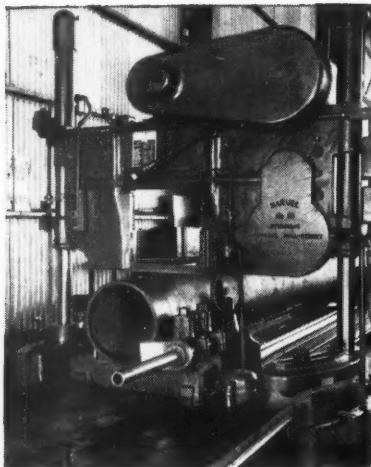
This new versatile miller . . . the Van Norman No. 16 . . . is especially applicable for tool room, pattern shop, die and mold shop, experimental laboratory and machine shop. Thoroughly modern design features . . . plus the adjustable cutterhead and movable ram . . . make this new miller outstanding in its work range. Not only does the No. 16 miller save time by minimizing work set-ups, but its versatility, accuracy and ease of control speeds up milling operations and cuts cost. Write for information and bulletin.

CHECK THESE VAN NORMAN ADVANTAGES

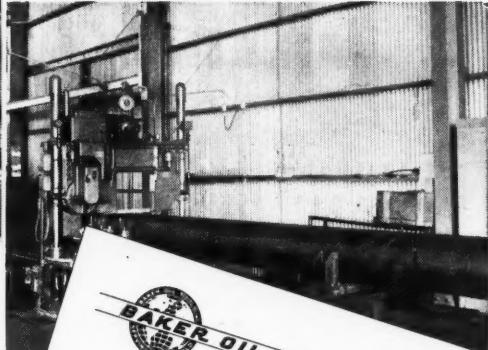
- Adjustable cutterhead permits conventional horizontal and vertical as well as angular milling with standard cutters and arbors.
- Movable ram in combination with saddle and knee movement increase versatility and work range of the machine.
- Single lever built-in controls, mounted on side of column, enable the operator to start and stop spindle only . . . or start spindle and coolant flowing . . . or start spindle drive, power longitudinal table feed and coolant. The same lever reverses spindle drive direction, etc.
- "Start-Stop" switch on front of knee permits operator to start and stop machine from the front operating position.
- Nine spindle speeds from 95 to 2000 R. P. M.
- Power feed is provided for table longitudinal travel. Nine feeds from $\frac{1}{8}$ " to 16"
- New heavy cutterhead plus new spindle transmission provides greater load-carrying capacity.
- Large hand wheels and large dials permit easy cross, vertical and longitudinal adjustments.
- Available with plain or universal saddle.



VAN NORMAN COMPANY
SPRINGFIELD 7, MASSACHUSETTS



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Cutting-off steel tubing, generally considered a slow and costly operation is done quickly and economically, on a large scale, at Baker Oil Tools, Inc. two plants. Really large tubes, up to 18" in diameter are handled on the Giant No. 18 Marvel Hydraulic Hack Saw, illustrated above, quickly and accurately cutting off large steel oil well casing and casing coupling stock. This company also has a No. 6A MARVEL High Speed Production Saw, (capacity 6" x 6") for automatically cutting off single or nested tubes or bars of smaller diameter. Solid stock or tubes, they're all the same to MARVEL Saws.

Whatever your metal sawing problems, there are MARVEL Saws exactly suited to your requirements. Your local MARVEL Sawing Engineer will gladly analyze your problem, make recommendations and quote costs.

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August 11, 1947

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5700 BLOOMINGDALE AVENUE
CHICAGO 39, ILLINOIS

Armstrong-Blum Mfg. Company
5700 Bloomingdale Avenue
Chicago 39, Illinois

Gentlemen:

We are well satisfied with the results which we are getting from our two Marvel High Speed Hack Saws, and from our No. 6A Marvel High Speed Production Saw. Production time and production costs have been reduced since these machines have been in service.

At the present time we have a No. 6A Marvel Saw on order which will replace an obsolete machine and we are expecting again to improve our production when it is put into operation.

Your factory representatives have been very considerate and have taken care of our needs quite satisfactorily.

BAKER OIL TOOLS, INC.
C. A. McDonald
C. A. McDonald
Production Manager

MARVEL Metal Cutting
SAWS.
Better Machines-Better Blades

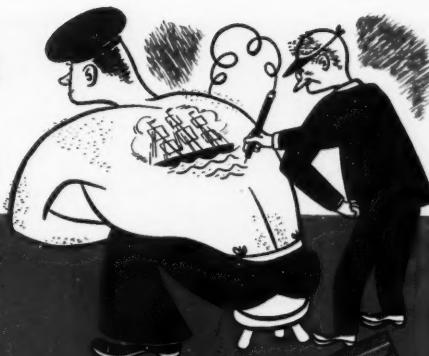
ARMSTRONG-BLUM MFG. COMPANY

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"The Hack Saw People"

CHICAGO 39, U.S.A.

Get SMOOTH SURFACES
for
Accurate Layout Work

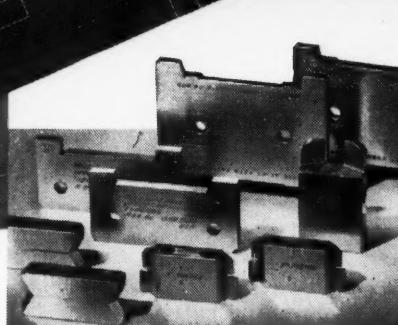


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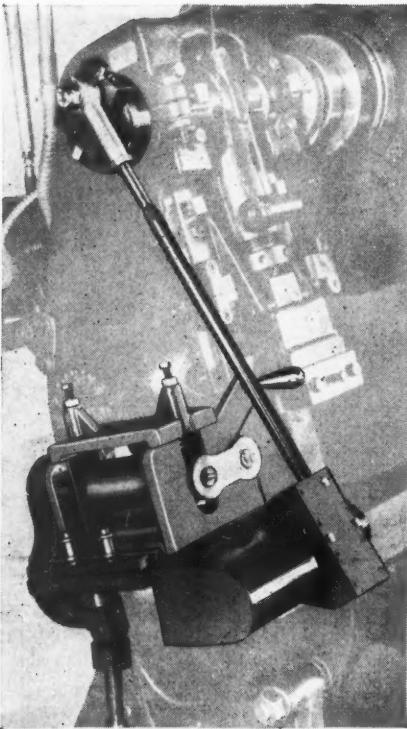
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IT'S ACCURATE**

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2. Hardened, ground and chrome plated feed rolls.
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WRITE TODAY FOR FACTS.

This feed is well built for hard daily use, of simple design to eliminate all complicated parts and to insure rapid, smooth, and accurate feeds under all conditions.

WHYTE ENGINEERING COMPANY

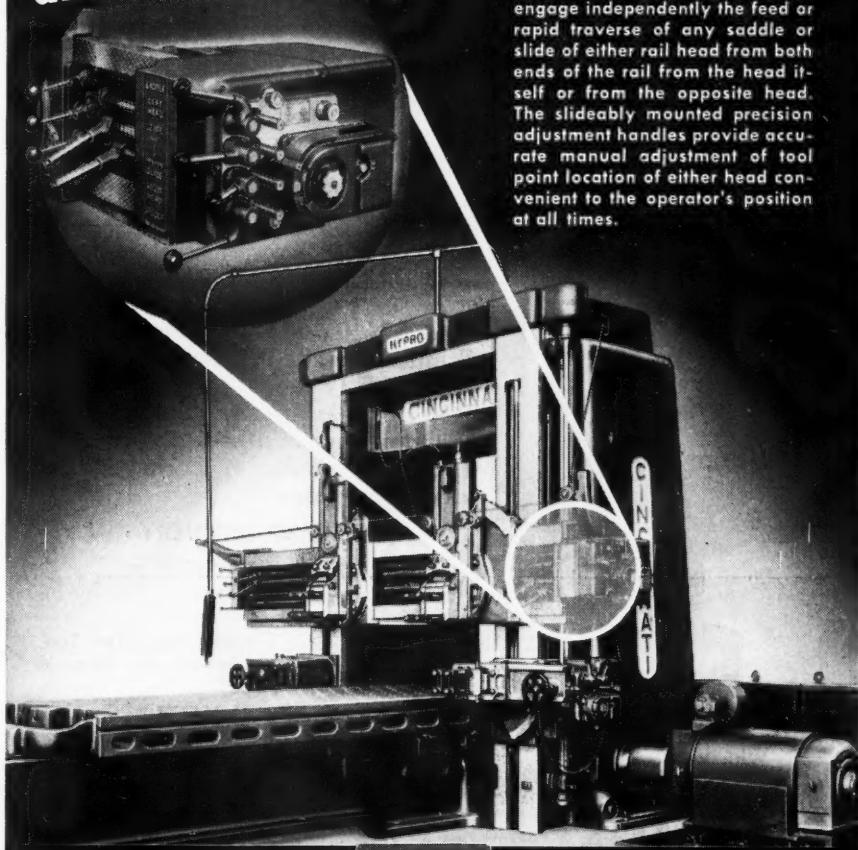
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**Die Feeds . Dial Feeds . Slide Feeds
Pick-off Attachments . Stock Straighteners . Lamination Dies**

NOW WITH THE NEW, MORE EFFICIENT
CINCINNATI Hypro Dual Saddle Control
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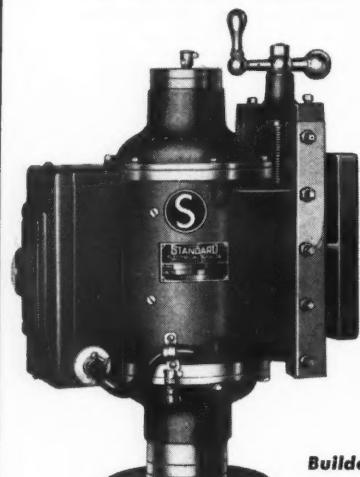
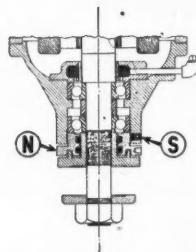
... it is possible to engage or disengage independently the feed or rapid traverse of any saddle or slide of either rail head from both ends of the rail from the head itself or from the opposite head. The slideably mounted precision adjustment handles provide accurate manual adjustment of tool point location of either head convenient to the operator's position at all times.



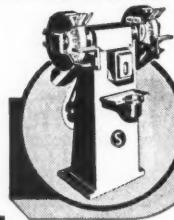
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PLANERS - BORING MILLS - PLANER TYPE MILLERS
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STANDARDIZE WITH STANDARD

This sectional view illustrates a creation of STANDARD engineers—evidence that you receive more when you buy a STANDARD tool. Sectional view of thrust bearing construction on all STANDARD modern Vertical Spindle and Double End Disc Grinders.



TYPE PAV
With Vertical Feed



Threaded Nut "N" permits fractional thousandths adjustment by releasing Set Screw "S" to take up wear on bearings without removing wheel — no shims involved.

The STANDARD Vertical Spindle Grinder is made in sizes from $\frac{1}{2}$ H.P. to 15 H.P. Speeds of 1150, 1750 or 3450 r.p.m. for cup or plate mounted cylinder type of wheel. Suitable for application to Planer, Boring Mill or special purposes.

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BUFFING AND POLISHING MACHINES: Sizes $\frac{1}{2}$ H.P. to 60 H.P. "Speedial" control with infinitely variable speed 1500 to 3000 r.p.m.

SPEED AND CHUCKING LATHES.

COMPLETE CATALOG ON REQUEST

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LEARN HOW TO CUT COSTS WITH GREENLEE MACHINES

SEE HOW AUTOMATIC TRANSFER-TYPE PROCESSING MACHINES CUT COSTS

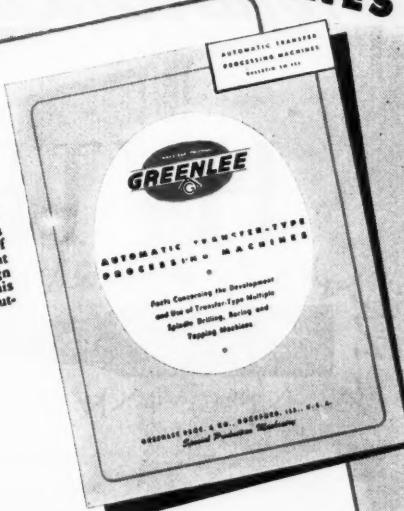
Modern mass production requirements offer many opportunities for the use of machines of this type—on which a large number of operations can be performed, with the pieces being transferred automatically from station to station through the machine. Costs are slashed by reduction of idle time, elimination of work-handling, combination of processes, and efficient use of floor space. Greenlee has pioneered in the design and manufacture of these machines since 1934—this booklet traces their development and illustrates outstanding examples of successful applications.

NEW RELEASED TYPE
LEAD-SCREW FEED
BOOKLET A-401



SEE HOW CUTS COST ON PRECISION-THREADED PARTS

The numerous advantages of Greenlee Automatic Screw Machines are further enhanced by the advent of lead-screw feed—which produces precision work on threaded parts at screw-machine production rates. The Greenlee system is quickly adaptable to a wide range of work, insures uniform high-quality results, reduces scrap losses, increases the usefulness of the machine, and cuts costs substantially. The mechanism can be added to existing Greenlee machines.



AUTOMATIC TRANSFER-TYPE
PROCESSING MACHINES
BOOKLET A-401

GREENLEE BROS. & CO., ROCKFORD, ILL., U.S.A.
General Production Manager

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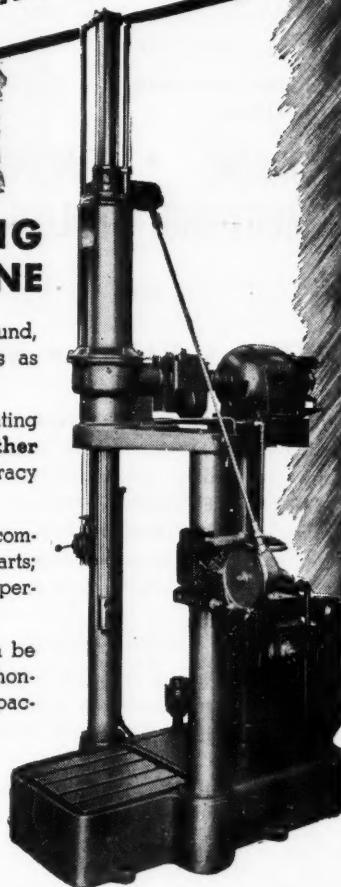
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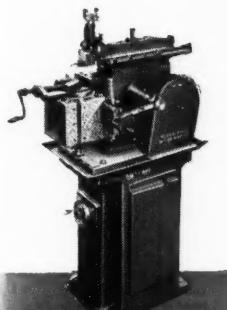
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GIVES LOGAN LATHES
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V and flat ways of the heavy-ribbed Logan Lathe bed are held to within .0005" of parallelism. The front bearing seat on the Logan Lathe ball bearing mounted spindle can vary no more than .0002". Total spindle runout 12 inches from the bearing is less than .0008". To hold to tolerances like these, one of every seven men building Logan Lathes is an inspector, skilled in the use of the most modern precision instruments. Operations, individual parts, sub-assemblies and completed machines are checked. That is why the Logan Lathe has earned a reputation for sustained accuracy and dependable, low-cost service in all fields of industry. Full information on the complete line of Logan Lathes and Shapers at your Logan dealer's, or on written request.



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LOGAN ENGINEERING CO. CHICAGO 30, ILLINOIS

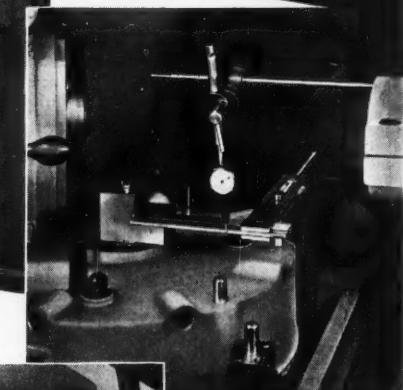
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With a single set-up combinations of the above may also be ground, securing perfect blending of straight and curved surfaces and extreme accuracy.

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GRINDER*



Sine bar arrangement in place,
showing method of setting work-
head at any predetermined angle.



Worktable clamping device,
with micrometer adjustment.



Write for Literature

Illustrates many set-ups and gives
full information and specifications.

MEMO

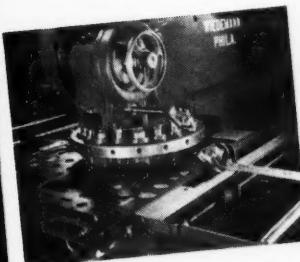
A REMINDER TO THE THOUSANDS OF ECONOMY MINDED
PRODUCTION MEN WHO SAW
THE WIEDEMANN METHOD OF SHORT RUN PIERCING OF
SHEETS AND PLATES AT THE MACHINE TOOL SHOW:

1. If you have mislaid the literature on Wiedemann Turret Punch Presses which you took at the booth — just fill out the coupon below and send it to us.
2. We will be pleased to arrange for a Wiedemann agent to talk over your particular problems with you and make specific time-saving recommendations.

IF YOU DID NOT SEE THE WIEDEMANN METHOD OF REDUCING SHORT RUN PIERCING TIME FROM HOURS TO MINUTES—

Send for Wiedemann Bulletin 101 and Data Sheet — the startling speed and accuracy of the Wiedemann Method should be welcome news in your shop.

HERE'S A TYPICAL
EXAMPLE OF
WHAT WE MEAN . . .



Wiedemann type R-41 P Turret
Punch Press up to 18 turret sta-
tions, 100 strokes per minute.
24,000 lbs. pressure capacity.
Will pierce up to $3\frac{1}{8}$ " holes in
14-ga. mild steel.

16 gauge (.062") mild steel $8\frac{1}{8}$ "
 $\times 10\frac{9}{16}$ ".

14 different dies used requiring 14
turret positions.

Set up time — $4\frac{1}{2}$ minutes.

Time to pierce 32 openings includ-
ing turret rotation — 3 minutes,
40 seconds.

Time to produce first piece — 8
minutes, 10 seconds.

Time for next seven pieces — 3
minutes, 40 seconds each.

Produced on Wiedemann Type
R 41 P.



WIEDEMANN
MACHINE COMPANY
4219 Wissahickon Avenue, Phila. 32, Pa.

WIEDEMANN MACHINE COMPANY
4219 Wissahickon Avenue
Philadelphia 32, Pennsylvania

Please send me literature on Wiedemann Turret
Punch Presses.

Please arrange for a Wiedemann agent to discuss
our problems with us.

Name _____

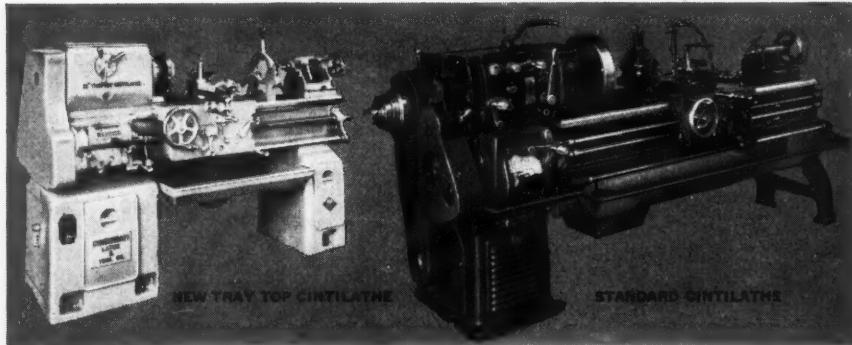
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CINTILATHES

of Outstanding Value



THE NEW TRAY TOP CINTILATHE, a light duty, low cost, Motor Driven Geared Head Engine Lathe, offers features not usually included in lathes of their size and price range. Built in 10", 12½", 15" and 18" swing sizes, and distances between centers from 18" to 60", 12 spindle speeds, with an overall ratio of 41 to 1, 48 thread and feed changes.

Standard Motor Drive 10"-1 H.P., 12½"-1½ H.P., 15"-2 H.P., 18"-3 H.P.

* * * * *

THE NEW CONTOURMATIC CINTILATHE, a standard engine lathe equipped with a simplified all-hydraulic, sensitive tracing attachment, automatically and accurately duplicates the contour of a master template. The master may be a turned work piece or a flat template.

The New Contourmatic Cintilathe produces work of a circular cross section such as multiple diameter shafts or similar parts which may include grinding necks, tapers in both directions, shoulders, or irregular contours along the axis, unaffected by the variations incurred with operator controlled machines.

STANDARD CINTILATHES in six nominal swings 14" to 24", bed lengths providing distances between centers from 32" to 238", 12 Spindle Speeds—32 changes of threads and feeds. These medium duty, low cost lathes handle a wide variety of turning, boring and threading operations for long or short run lots. They offer capacity for practically all of your lathe work with a minimum of investment.

* * * * *

THE NEW TRACERMATIC CINTILATHE is a special machine for use primarily on molds for bottles, table ware and other items in glass industry, embossing dies, dies for plastics, etc., where extreme accuracy, fineness of detail, and speed of production are required.

The work need not be circular in cross section. Ovals, squares, rectangles, etc., with rounded corners and intricate patterns are readily produced.

Write for catalog, price and
delivery on the "CINTILATHE"
line of lathes.

CINCINNATI

CABLE ADDRESS: CINTILATHE



LATHE & TOOL CO.

OAKLEY, CINCINNATI 9, OHIO



1/3 MORE OUTPUT PER DAY

THIS large midwest gray iron foundry had a number of automotive jobs where the cleaning of recesses required an extension grinder. Their grinders were air type, operating at 7200 RPM. It was a bottleneck; so they called in the Rotor Application Engineer to find a better way.

They had 180 cycle current available so the Rotor man recommended a high cycle grinder with a 27" extension, 10,800 RPM speed and 2" cone wheel. Results:

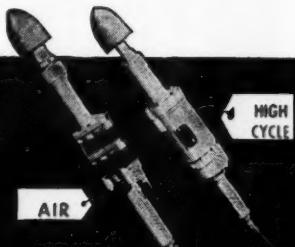
33½% more castings per day because of stepped up RPM and because the high cycle grinder *maintains its speed under load*.

High cycle grinder has capacity to absorb temporary overload and does not lose power with age.

The Rotor man will be glad to make a similar study in your plant to see if there are ways to cut costs.

HI-CYCLE O'TOOL

THE ROTOR TOOL CO.
CLEVELAND OHIO



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HF-100



H-200

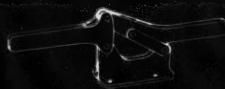


H-400

**Drills can operate over work
held with *These* clamps**



H-600



HC-600

Being of low, horizontal design, these Knu-Vise toggle action clamps offer no interference to tools operating above them. There are no handles to handicap the free movement of drills.

There's a model to meet your specific need.

Model HF-100 has closed toggle bar—one rubber cap.

Model H-200 provides channel for positioning pressure spindle.

Model HC-600 has closed toggle bar.

Model H-400 used where more clamping power is required.

Model H-600 provided with adjustable spindle.

Send for complete catalog.

LAPEER MANUFACTURING Co.

General Sales Office: 2906 W. Grand Boulevard • Detroit 2, Michigan
Manufacturers of the famous Knu-Vise Products, Lapeer, Mich.

IT GETS BETTER...

AND BETTER...



THE MORE..
YOU LOOK
AT IT

The New ROCKFORD Hy-Draulic OPENSIDE PLANER



WRITE FOR THE FACTS

Ask for Catalog 450. Gives the complete story of the Rockford Hy-Draulic Openside Planer . . . built in four sizes, each in a selection of six stroke lengths from 10 to 20 feet.

Inspect the Hy-Draulic Openside Planer critically. When you do you'll be convinced that only Hy-Draulic design can give you all the advantages you want in a new planer. For example, levers in duplicate on either side of the bed plus the overhead movable pendant give full control of table travel and power rapid traverses. All adjustments are easily made; table cutting and return stroke speeds are set at the hydraulic pump . . . selection of speeds is infinite within a wide range . . . direction of power rapid traverses and feeds are selected by levers located at the column-end of the crossrail . . . Hy-Draulic Feed is set by simple handwheel adjustment. For proof of extreme rigidity, check the massive column of the Rockford Openside Planer. Every type of work and material may be cut without reducing accuracy. For complete details consult your nearest Rockford Hy-Draulic representative.

ROCKFORD MACHINE TOOL CO.
ROCKFORD ILLINOIS

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Hy-Draulic

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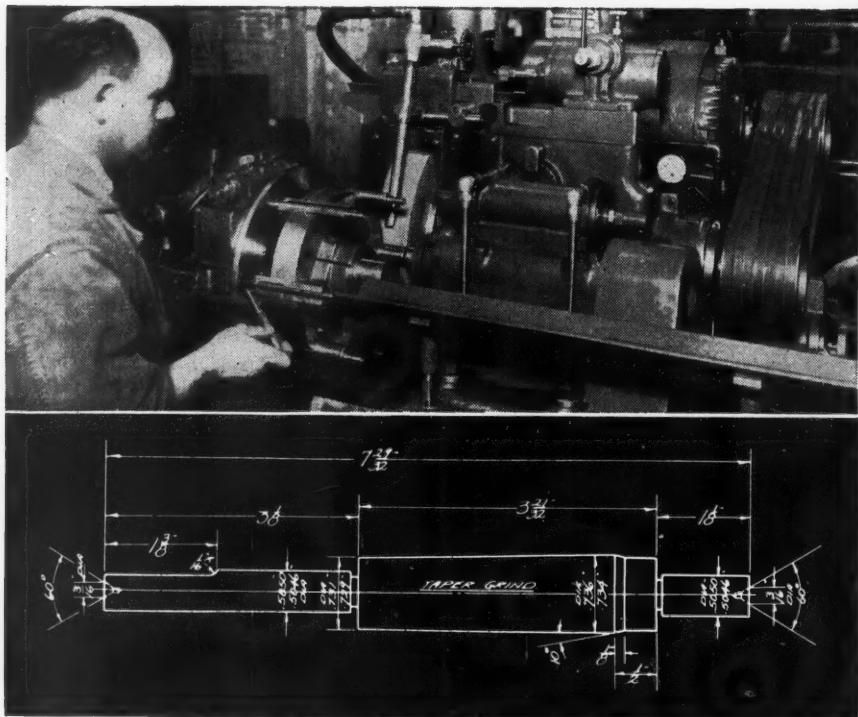
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PLANERS

SLOTTERS

SHAPER-PLANER





ARTER for SHAFTS

No. 135 Automatic Cylindrical Grinder

Automatic handling of work with plunge cut grinding. This highly productive grinder maintains concentricity of diameters as the work is ground on centers.

Name of part . . . Washing machine motor shaft.
Material . . . S.A.E.B. 1112 CR Steel.
Stock removed . . . 012" average.
Limits0004" on bearing diameters.
Surfaces ground . . . three.
Production . . . 300 finished pieces per hour.

ARTER GRINDING MACHINE CO.
WORCESTER, MASSACHUSETTS • U.S.A.

ROSS Speed Control VALVE

Provides Split-Second Timing of Piston
Movements by Positive Control of Air Flow



Available in sizes $\frac{1}{4}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ " and $\frac{3}{4}$ "

With air flow regulated by screw action, changes in volume take place with constant progression—not a series of "steps"—but with micrometer accuracy. Control of the air flow is absolute—from zero to maximum.

Simple—dependable—rugged. Only two moving parts—stem and poppet.

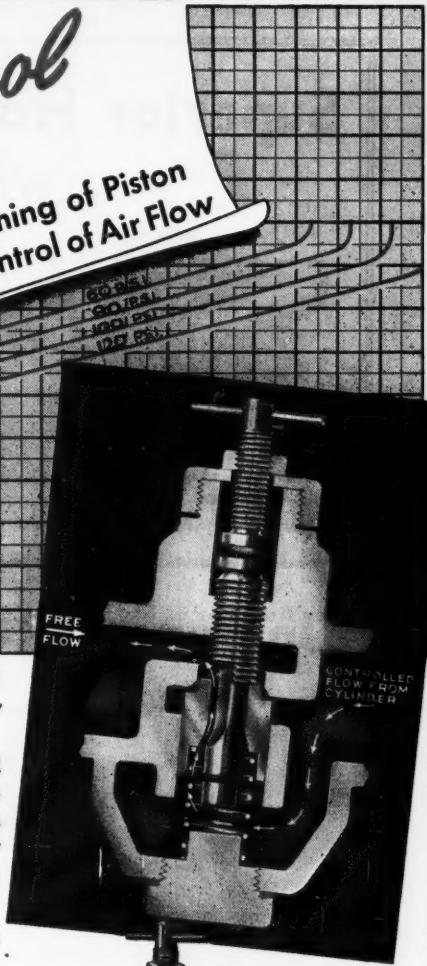
Write for bulletin which gives information on different sizes and applications.



ROSS
Operating
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THE BRIDLE FOR AIR HORSEPOWER



**ONLY 2
MOVABLE
PARTS
• STEM
• POPPET**

Superior Holding Power with ACME VISES

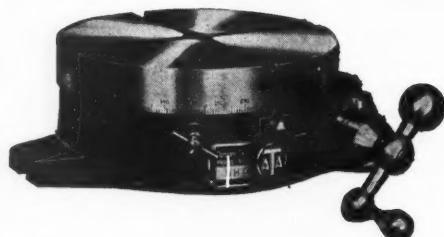


Acme Vises have all the essential features that will rigidly hold your work to the bench.

Accurately Fitted Spindle
Unbreakable Sleeve Nut
Even, Central Pull
No Side Twist
Interchangeable Jaws

Made in 11 sizes from 2" to 6" for Light or Heavy Duty.

Universal ROTARY TABLES



★ Made in 7 sizes

★ Often takes the place of costly fixtures

★ Reduces set-up time

★ Used for many operations on milling machines, drill presses and horizontal boring mills.

Dividing attachments are available to fit all Rotary tables, except the 9". One attachment is interchangeable on 3 sizes of Rotary tables.

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Prompt Delivery



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69 WEST BROADWAY

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GRAND RAPIDS GRINDING MACHINES



Grand Rapids Combination Tap & Drill Grinder No. 10-B

**DELIVER
TOP TOOL ROOM
EFFICIENCY**

Whether you need a Universal Cutter and Tool Grinder or a Combination Tap and Drill Grinder, you can be sure of top tool room efficiency if they bear the name "Grand Rapids," manufactured by Gallmeyer & Livingston Co.

With the Combination Tap and Drill Grinder you save three ways: 1. On first cost, 2. Through lower maintenance expense, 3. On valuable floor space.

With Grand Rapids No. 60 Universal Cutter and Tool Grinder you can handle complex tool grinding jobs with maximum speed and convenience.

Write for descriptive bulletins
GL 8-46 describes the No. 10-B
2-28-46 describes the No. 60



Grand Rapids No. 60 Universal Cutter and Tool Grinder



What "GRAND RAPIDS" Quality Means: Gallmeyer & Livingston

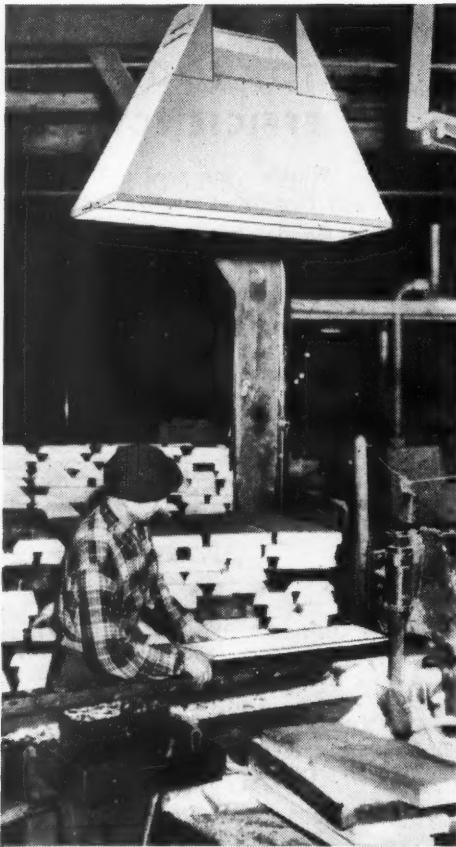
cast their close-grained gray iron, machine to micrometric tolerances, precision-assemble grinding machinery of unsurpassed performance. *Grand Rapids* means *top quality* in grinding machinery.

GALLMEYER & LIVINGSTON COMPANY, 308 STRAIGHT ST., S. W., GRAND RAPIDS 4, MICH.

CARTER Guide-Line LIGHT

The Shadow that Guides a Saw

**SPEEDS UP & IMPROVES
STRAIGHT-LINE SAWING**



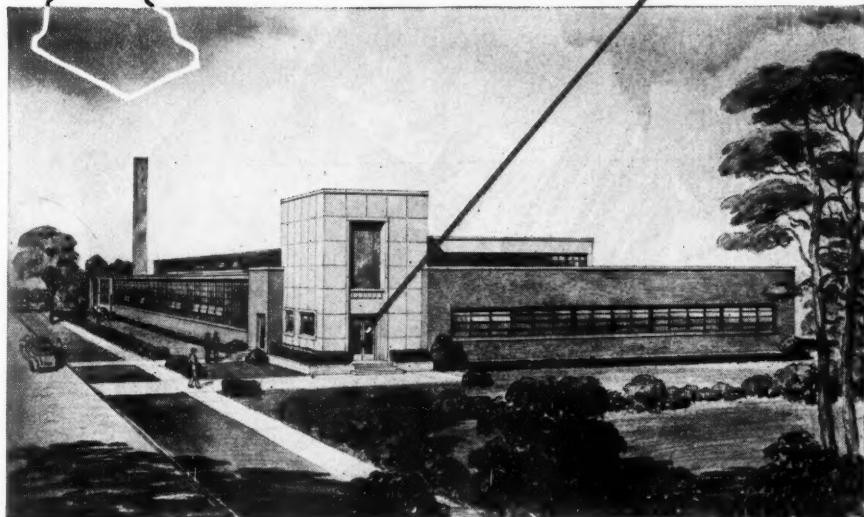
Don't let increased labor and lumber costs put you behind the eight-ball with low-cost production. The installation of CARTER Guide-Line LIGHTS on your straight-line saws will speed up your production and improve your cutting job . . . "The Shadow that Guides a Saw," projected by the CARTER Guide-Line LIGHT, is a straight, sharp, black line that shows your operator instantly and exactly where each saw cut will be made. A tilting device permits the shadow to be cast either as a center guide or a base line at either right or left side of the stock. . . . Write TODAY for complete data on this time and material saving precision light.

CARTER PRODUCTS COMPANY

959 MICHIGAN TRUST BLDG.

GRAND RAPIDS 2, MICHIGAN

here is the new home of the snow air-operated tapping, drilling and threading machines



It's something of an achievement to be recognized as an authority in your field. It's even more of an achievement to gain a reputation for quality and service at the same time. One reason the Snow Manufacturing Company has gained this reputation is its integrated operation—from the drafting table to the finished product. Every step is under direct control.

To maintain this policy, we have erected one of the finest and most up-to-date machine tool plants in the country. Thirteen miles west of Chicago's Loop, it is easily accessible—bus and "L" lines practically to the door. Washington Blvd. if you are driving. Come out and see us.

SNOW MANUFACTURING COMPANY

443 EASTERN AVE., BELLWOOD, ILL. • SUBURB OF CHICAGO



DO IT WITH A DUOMATIC



Here is an amazing demonstration of the speed and versatility of the new Lodge & Shipley 2-A Duomatic (automatic) Lathe.

Complete machining of this unique stoker output shaft was obtained . . . turning, necking and chamfering . . . in one operation . . . using nine carbide tipped tools.

From a rough forging to a finished shaft . . . in 2/5 of a minute. That's production . . . and but a single example of the versatility of the 2-A Duomatic on large or small lots.

Write for the 2-A Duomatic Catalog giving complete details of this amazing new automatic lathe. Lodge & Shipley Engineers will be glad to offer advice on the latest in lathe production methods and equipment without obligation.



THE **Lodge & Shipley**
COMPANY
CINCINNATI 25, OHIO
MACHINE TOOL DIVISION • 3055 COLERAIN
SPECIAL PRODUCTS DIVISION • 800 EVANS ST.

★ Hammond Radial Drilling and Tapping Machines may be spotted in the production line for drilling, tapping or reaming. With its unique bracket type construction the spindle can be swung quickly from hole to hole. Six quick speed changes are instantly available and the Hammond tapping reserve is very fast and convenient to operate.

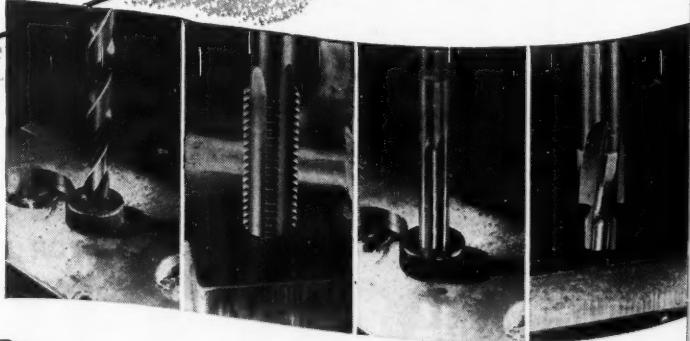
THE FOOTE-BURT COMPANY

CLEVELAND 8, OHIO

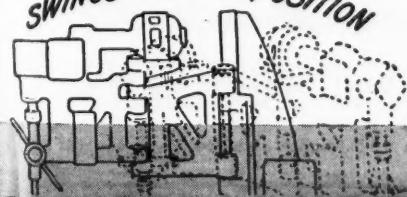
Detroit Office: General Motors Building



*a handy drilling and tapping
machine for in-the-line operations*



SWINGS TO ANY POSITION



FOOTBURT-HAMMOND

*Radial
DRILLING MACHINES*



**PICK THESE
BLADES**

for LONGER CUTTING LIFE

For most economical production metal-sawing, pick the long-life GRIFFIN SPECIAL ALLOY. Molybdenum high speed steel. Machine and hand frame sizes.

To cut stainless, chrome, nickel and all other tough alloys, pick the GRIFFIN HIGH SPEED STEEL. 18-4-1 tungsten high speed steel. Machine and hand frame size.

For any hand-frame use, pick the tough, all-purpose NEW GRIFFIN. Flexible as a soft-back, durable as an all-hard.

For hand-cutting thinnest sheet, tubing, conduit, etc., pick the GRIFFIN NON-STRIP. Teeth don't snap out.

For precision contour cutting, pick GRIFFIN BAND SAWS. Four types for metal-cutting and wood-cutting.

Write for latest 20-page Griffin Price List
Full descriptions, sizes, selection tables, etc.

General Sales Agent

JOHN H. GRAHAM & CO., INC.,
Dept. D, 105 Duane St., New York 7, N. Y.

ASK YOUR DISTRIBUTOR FOR

•G R I F F I N•

HACK SAW BLADES and BAND SAWS

Made by G. W. GRIFFIN CO., Franklin, N. H., Hack and Coping Saw Blade Specialists since 1880

When you're glad you have a Snap-on

Pulling up Bearing on Swing
and Traction Reverse Shaft.

Snap-on's Heavy-Duty Blue-Point Boxockets give you powerful leverage to turn those stubborn, large size nuts and bolts. There is no danger of slipping for Boxocket openings completely encircle the nut . . . giving equal pressure on all six sides. You can really "bear down" and complete the job quickly and safely. Each wrench head has a locking button which engages a lock hole in the handle requiring deliberate action to unlock the combination.

Blue-Point Boxocket heads are compactly designed to reach into places where many other types of wrenches cannot possibly be used. The double hexagon broaching gives you the additional advantage of a short turning arc where obstructions restrict free swinging. Sizes available from $1\frac{1}{8}$ " to $3\frac{1}{8}$ " with four handles from 18" to 36".



Unit Crane & Shovel Corp. use many Snap-on tools in the production of their complete line of rubber-tired and crawler-mounted material handling equipment.



**SNAP-ON TOOLS CORPORATION, 8032-L 28th Ave., Kenosha, Wis.
International Division: Kenosha, Wis., U.S.A.**

UNBRAKO

Reg. U. S. Pat. Off.



(A)



(B)

Pat'd. &
Pats. Pend.



(C)

Pat'd. &
Pats. Pend.

Knurling of Socket
Screws originated with
"Unbrako" in 1934.

... HIGH PRECISION, EXTREME STRENGTH

"Unbrako" Socket Screw Products, famous throughout Industry, are used by the millions. The "Unbrako" Flat Head Socket Cap Screw (A), the "Unbrako" Socket Set Screw with the Knurled Cup Point, (B), and the "Unbrako" Socket Set Screw with Knurled Threads (C)—are representative of "Unbrako" internal wrenching, extreme strength and precision. The ever-popular "Unbrako" Knurling feature in Figs. (B)—shown upside down—and (C) makes them dependable and unique Self-Lockers. Even when subjected to chattering vibration, the Knurled Cup Point of "Unbrako" Fig. (B) stays dug when screwed home, while the Knurled threads of "Unbrako" Fig. (C) positively prevent backing-out of screws with points such as: flat, dog, cone and oval which do not lend themselves to knurling. Write now for informative "Unbrako" Catalog of Socket Screw Products.

"Unbrako" Products are sold entirely through Industrial Distributors.

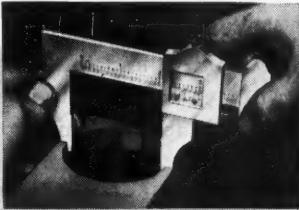
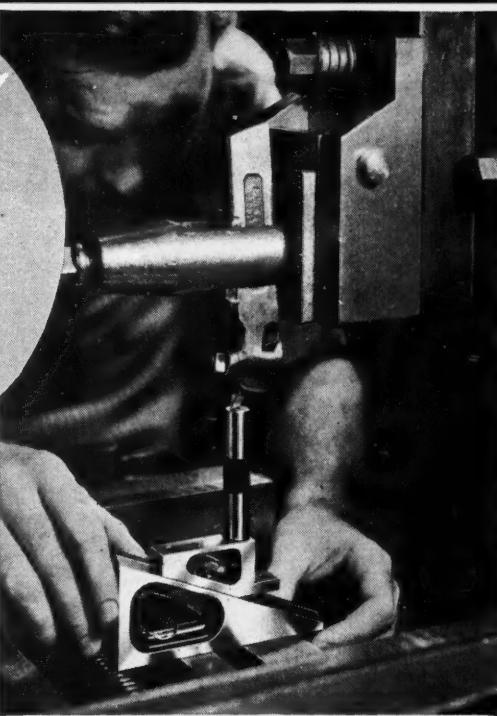
OVER 44 YEARS IN BUSINESS

STANDARD PRESSED STEEL CO.

JENKINTOWN, PENNA. BOX 556 • BRANCHES: BOSTON • CHICAGO • DETROIT • INDIANAPOLIS • ST. LOUIS • SAN FRANCISCO

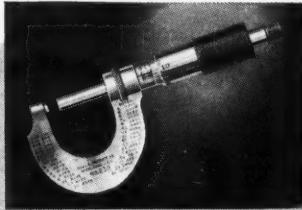
Save PLANER
and SHAPER Time
With this
STARRETT
Precision
Gage

operators can make every first cut "on the" by setting planer and shaper tools Starrett No. 599 Planer and Shaper. Used with a micrometer or Vernier, it will gage with extreme accuracy in its range of $\frac{1}{4}$ to $6\frac{1}{2}$ inches. Also as a universal height gage and gap. Alignment and parallelism of ends, and work contacts held to close limits lateral play eliminated by angular slide. Note handy level.



AS NECESSARY AS SKILLED MEN

Leading shops rate STARRETT Vernier Tools high on their list of essential shop equipment. STARRETT Vernier Caliper No. 122 (shown above) is a sound, long-term investment in dependable, uniform accuracy. Sharp, clean-cut, easy-reading gradations; perfect workmanship, finish and balance — all guaranteed by the STARRETT reputation.



SYMBOL OF SAF., SURE ACCURACY

STARRETT Micrometers are indispensable equipment for skilled craftsmen in tool rooms, in the shop, at the inspection bench. STARRETT No. 230 shown above measures by thousandths up to one inch, can be ordered chromed plated for stain resistance, long wear, easy reading. More than 300 different models and sizes in the complete Starrett line make it easy to select the one best micrometer for any job.

Write for Complete Starrett Catalog No. "MD"

Buy Through Your Distributor

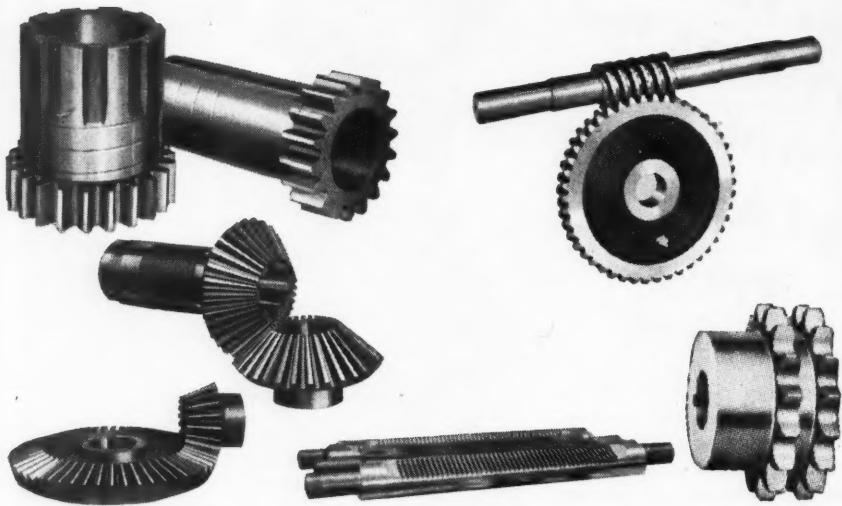
THE L. S. STARRETT CO. • ATHOL, MASSACHUSETTS • U. S. A.

World's Greatest Toolmakers

STARRETT

PRECISION TOOLS • DIAL INDICATORS • STEEL TAPES • GROUND FLAT STOCK
HACKSAWS • BAND SAWS FOR CUTTING METAL, WOOD, PLASTICS

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the ADAMS line

**SPUR GEARS
HELICAL GEARS
BEVEL AND MITER
GEARS
WORMS AND
WORM GEARS
INTERNAL GEARS
(Spur and Helical)
SPROCKETS
RATCHETS
SPLINED SHAFTS
RACKS
LEAD AND FEED
SCREWS
GROUND TOOTH
GEARS (Spur and
Helical)
SHAVED TOOTH
GEARS (Spur and
Helical)
GROUND THREAD
WORMS**

Quality control at ADAMS pays you dividends!

In every stage of their manufacture, Adams precision-made gears are subjected to rigid inspections for quality control and to assure exact conformance with your specifications. The inspections go on continuously. This careful attention to detail right down the line pays you dividends in two ways — it means fewer rejects and it means better performance for your product. **THE ADAMS COMPANY, 1942 Cypress Street, Dubuque, Iowa.**

The ADAMS Company

Dubuque, Iowa, U. S. A.

ESTABLISHED 1883

**FINE GEARS MADE TO
YOUR SPECIFICATIONS**





A STEEL BAR SERVICE GEARED FOR *Action*



Your Union Drawn Distributor considers FAST, DEPENDABLE SERV-

ICE his most important stock-in-trade. That's why he always is ready to go into action on *all* your steel bar and shafting needs—normal or emergency.

His conveniently-located warehouse is stocked with cold finished bars and shafting in the sizes and shapes most used in

your area—is equipped to deliver them to you . . . fast. If unexpected demands cause a temporary shortage, his broad experience plus his close contact with the mill often work wonders in locating and delivering the bars you require.

To get 'em *fast*, call him *first*. Tell him what you need today—what you expect you'll need next week and next month. Then he'll be prepared to give you the best in steel bar service.



GROBET RIFFLERS

Left to right:

No. 2 Silversmiths
Riffler

No. 9 Die-makers
Riffler

No. 12 and No. 18
Diesinkers
Rifflers

Send for Catalog SFR



Buy from the oldest file manufacturers in the world with over a century and a third of experience and reputation. GROBET produces more Rifflers, in more shapes and more sizes than any other company.

Ask for catalog SFR from your industrial supply house.

GROBET FILE CO. of AMERICA Inc.

421 Canal Street

IMPORTERS OF GROBET SWISS FILES



New York, 13 N. Y.

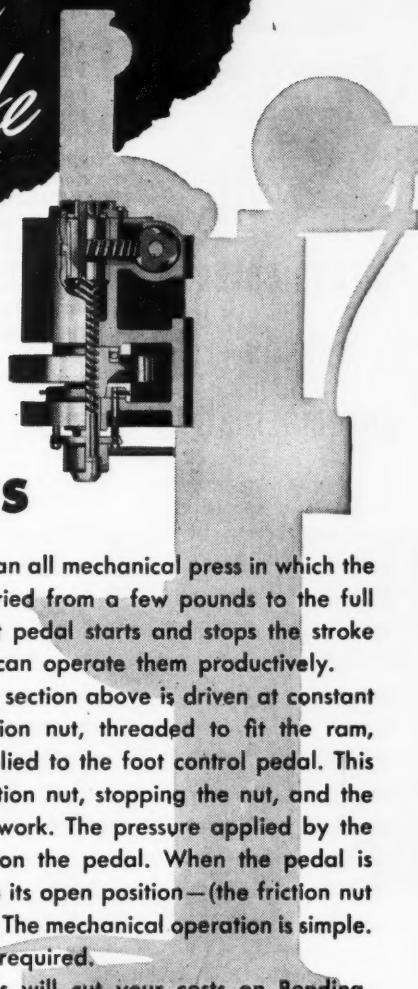
Plants: New York • Chicago • Los Angeles

MFRS. OF GROBET ROTARY FILES

*Any Pressure
at Any Stroke*

on

**GENERAL
FLEXIBLE
POWER PRESSES**



The General Flexible Power Press is an all mechanical press in which the pressure of each stroke may be varied from a few pounds to the full capacity of the press. A single foot pedal starts and stops the stroke and controls the pressure. Anyone can operate them productively.

The threaded ram shown in the section above is driven at constant speed through spline keys. A friction nut, threaded to fit the ram, revolves with it until pressure is applied to the foot control pedal. This tightens the brake band on the friction nut, stopping the nut, and the ram screws down through it to the work. The pressure applied by the ram is regulated by foot pressure on the pedal. When the pedal is released, a spring returns the ram to its open position—(the friction nut spiraling faster in the same direction). The mechanical operation is simple. Very little maintenance attention is required.

General Flexible Power Presses will cut your costs on Bending, Straightening, Assembling, Push Broaching and Cold Riveting operations.

Write for Bulletin No. 392

GENERAL MANUFACTURING CO.
6433 FARNSWORTH AVE. • DETROIT 11, MICHIGAN

3302

*Monarch's
Speedi-Matic
gives you*
**up to 10
preselected
speeds—
automatically**

- Automatic electronic speed change—repeated piece after piece without attention on the part of the operator!

That's one of the reasons why the Monarch Speedi-Matic is winning the reputation of the "World's Fastest Hand Screw Machine"—and justifiably so: finished-parts production times are really production times, hardly more than the total of the actual times required for the separate cuts—each made at the optimum surface cutting speed for that particular operation. (And spindle speeds range up to 5,000 rpm!)

Take the part shown, for example—five different spindle speeds, from a low of 250 rpm to a high of 3,800 rpm—yet the total time, including five separate machining operations, is only .43 minutes. Match that record on your present machine, if you can—then send for complete information on the Speedi-Matic!

THE MONARCH MACHINE TOOL CO. • SIDNEY, OHIO

THE PART—spring cap, $\frac{3}{8}$ " diam., $\frac{1}{8}$ " long; x 1315 steel.

THE PRODUCTION FACTS—Center drill at 3,800 rpm; $\frac{1}{2}$ " drill at 3,300 rpm; Flat bottom drill at 3,500 rpm; Thread at 250 rpm; Cutoff at 2,500 rpm. Total time—.43 minutes.



*Monarch
TURNING MACHINES*

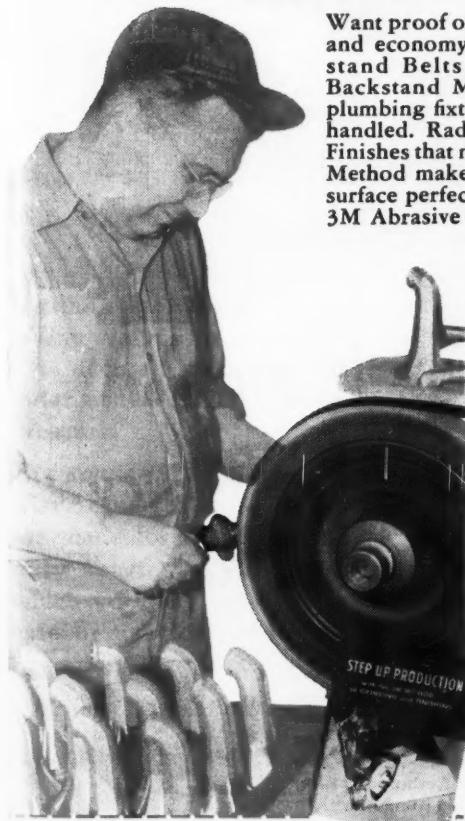
For "peak production at a profit"—on bar work up to $\frac{7}{8}$ " diameter, in lots of 25 to 500 or more—write for our new 20-page catalog on the Monarch Speedi-Matic.



TYPICAL EXAMPLE:

Production boosted...

Grinding costs slashed



Want proof of the versatility and economy of 3M Backstand Belts and the 3M Backstand Method? Take plumbing fixtures. Soft metals that must be carefully handled. Radical contours that are hard to reach. Finishes that must be near-perfect. The 3M Backstand Method makes it possible to reach and finish every surface perfectly while the uniform cutting action of 3M Abrasive Belts keeps final buffering costs at rock bottom. In one typical shop, 3M Backstand Belts have stepped up production, chopped costs 40%, reduced rejects by half.

3M service, however, goes further than the manufacture of good Backstand Belts. 3M Abrasive Engineers go out into the field—and develop better ways to use them to slash your production costs. Manufacturers in every field come to us with finishing problems and we work with them in their own shops to find practical answers.

In fact, you can get a whole bookful of answers by sending the coupon. And if you have a problem that calls for more than that, get in touch with your 3M Distributor or ask us to have a 3M Abrasives Engineer check into things for you. It'll be a pleasure.

Minnesota Mining & Mfg. Co., Dept. MM,
Saint Paul 6, Minn.
1247

Please send me a free copy of your booklet
"Step Up Production"

Name.....

Address.....

City..... Zone.. State.....

40%

3M
BACKSTAND BELTS

ANOTHER **3M** PRODUCT



Made in U. S. A. by

MINNESOTA MINING & MFG. CO.
Saint Paul 6, Minn.

RUTHMAN PUMPS



help you get
GREATER EFFICIENCY
on your machines

To the right is a 16" Lodge & Shipley Selective Head Engine Lathe equipped with a Model 2-P3 Long, 1/10 HP Gusher Coolant Pump. • To the left is a Baush Three-Spindle Vertical Boring Machine equipped with a Model 11025 Ruthman Gusher Coolant Pump.

Oversized pre-lubricated bearings requiring no further lubrication, electronically balanced, one-piece rigid shaft, no metal-to-metal contact gives greater efficiency in Ruthman Gusher Coolant Pumps. You are sure of years of trouble-free service at low maintenance cost when you specify Ruthman Gusher Coolant Pumps on your metal-cutting machinery.

Write for Catalog 10-F

THE RUTHMAN MACHINERY CO.

1817 Reading Road

Cincinnati 2, Ohio



Gang-Saw Rolls "NOPAK Operated"

The Johnson Manufacturing Co., Seattle, Wash., builds Cant Gang Saws of this type in various sizes and capacities. The model shown employs two NOPAK Model "A" Air Cylinders (6" x 12") with Self-Regulating Cushions at both ends of the stroke. As the rolls are lowered by the action of the cylinders, they apply pressure on the cant (log) so that the feed-rolls engage the cant to feed lumber into the saw. Two $\frac{3}{4}$ " NOPAK 4-Way Valves provide positive, accurate control of cylinder action at 100 p.s.i. air pressure.

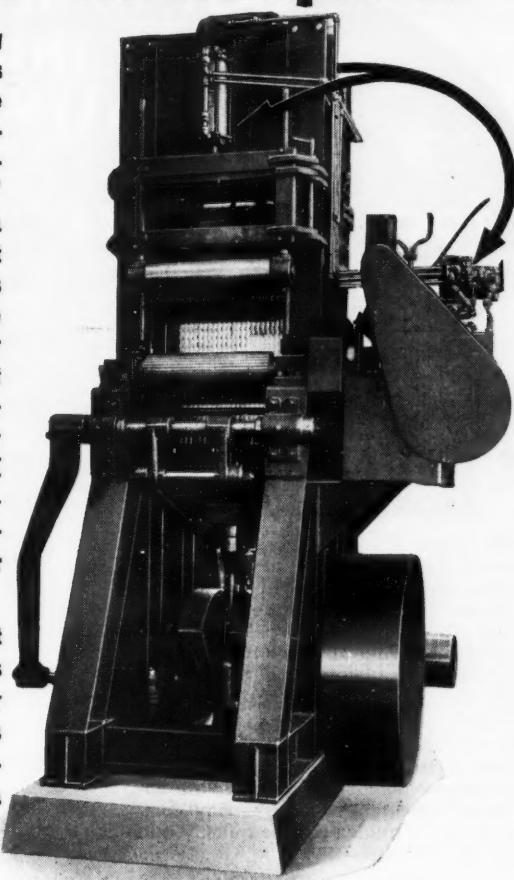
This application indicates that NOPAK Valves and Cylinders are made for rugged, heavy duty service on machines which you may build for resale or use for production operations in your plant.

Write for Bulletin 92-A.

GALLAND-HENNING MFG. CO., 2758 S. 31st St., Milwaukee 7, Wis.

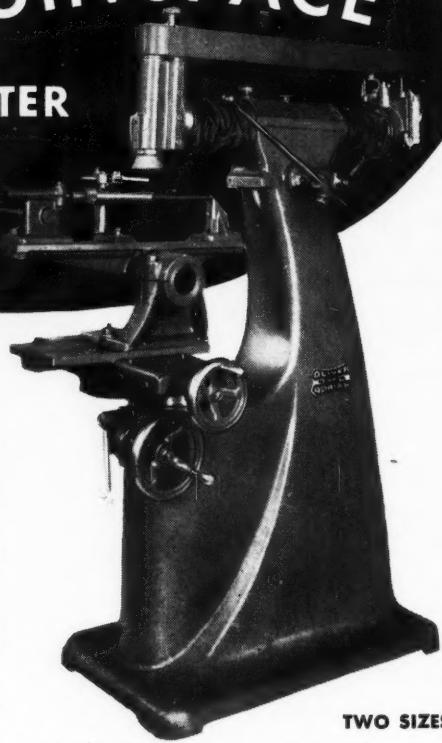
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NOPAK
VALVES AND CYLINDERS
DESIGNED for AIR and HYDRAULIC SERVICE



Machine designers, tool engineers, production men...ask your NOPAK Representative for a copy of the NOPAK Application Manual.

**EASY TO SET UP
QUICK TO INDEX
The Oliver ACE
TOOL AND CUTTER
GRINDER**



**• IT'S FASTER --
MORE ACCURATE**

The Oliver Ace keeps production cutters in tip-top condition at greatly lowered costs—It's simple to set up and physically easy to operate. Saves setting up time—Only two fixtures are needed to grind all standard type cutters. Work is always in direct view of the operator—No Stoop, No Squat, No Squint.

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THE HEAVY DUTY MODEL WAS DESIGNED TO CARE FOR YOUR TUNGSTEN CARBIDE CUTTER GRINDING. "IT'S TOPS."

TWO SIZES

Send for Illustrated Bulletin

OLIVER INSTRUMENT CO.

1430 E. MAUMEE ST.

ADRIAN, MICH.



AUTOMATIC DRILL GRINDERS
TOOL & CUTTER GRINDERS — DRILL
POINT THINNERS — TEMPLATE
TOOL GRINDERS — FACE MILL
GRINDERS — DIESMAKING MACHINES

THE KINGS OF EGYPT DID NOT BUILD THEIR PYRAMIDS

Like this



But

20TH CENTURY INDUSTRY HAS DONE IT..

Our whole social structure is based on mass production — and mass production is dependent on one entirely artificial product of man: the grinding wheel.

Since 1893 A. P. DeSanno & Son has been one of the pioneers in the field of grinding.

The first to introduce the high speed cut-off machine and cut-off wheel.

The producer of the internationally known Por-ox-way wheel—outstanding performance has made it a favorite in precision operations in American Industry.

The producer of Paraflex, the flexible rubber wheel.

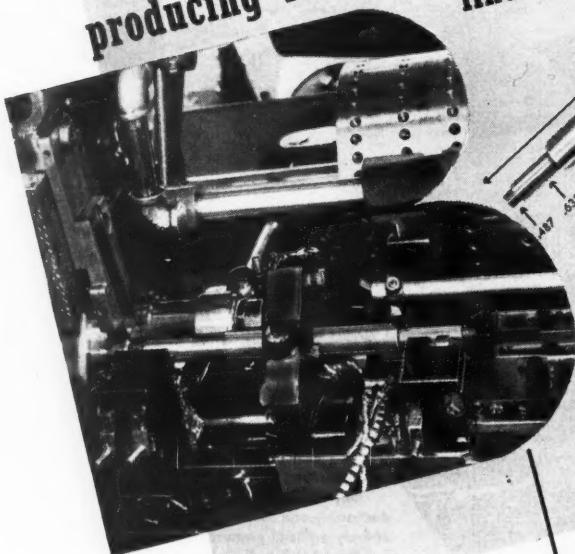
And now . . . contributing a highly perfected and scientific method of vitrified grinding wheel production — the 23 process — which provides that which plant managers, engineers, etc., appreciate above all: high performance and constant and accurate duplication.

A trial will convince you!

A. P. de Sanno & Son, Inc. PHOENIXVILLE, PENNA.

CLEVELAND

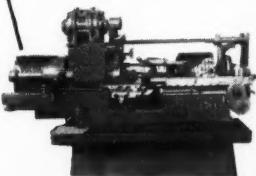
"Puts the Bee" on costs of
producing Multiple Diameter Shafts
like this



CLEVELAND MODEL B 18'
SHAFT MACHINE automatically
turning and forming rotor
shaft for fractional hp motor.

Operation sequence: Milling slide — steady with 3-roll rest on stock diameter; turn .632 diameter. At the same time, front slide forms in, and cross turns .978, .802, and .765 diameters. Rear slide under cuts and forms serrations on .802 diameter; breaks-down at rear of piece; breaks-down for cut-off; chamfers, undercuts and serrates .487 diameter of next piece. The cut-off is made with the independent cut-off attachment.

Remember, Clevelands cut
costs!



CLEVELAND MODEL B SHAFT MACHINES are designed for automatic production of long armature and transmission shafts, spindles, studs, bolts, etc. Made in 1 1/2" and 2 1/2" capacities for delivering pieces up to 18 inches, with multiple OD, shoulders and chamfers, plus one end working operation.

If your production involves work of this type, it will pay you to investigate Cleveland Model B Single Spindle Automatics. Write today for bulletin giving complete information.

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MODEL 125
 $\frac{1}{2}$ Inch Drill

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It's easy to drill metal, wood or plastics with a MallDrill. This portable electric tool has power to speed the bit through the toughest materials . . . stamina to

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Ask your Supplier for *MallDrills*, *Mall Grinders*, *Mall Screwdrivers* and *Mall Flexible Shafting* or write for literature.

POWER TOOL DIVISION

MALL TOOL COMPANY

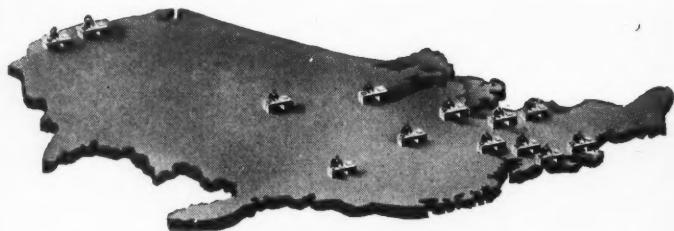
7814 South Chicago Avenue

Chicago 19, Illinois

26 Years of "Better Tools For Better Work"

A BUYING GUIDE FOR ABRASIVES

POINT No. 11

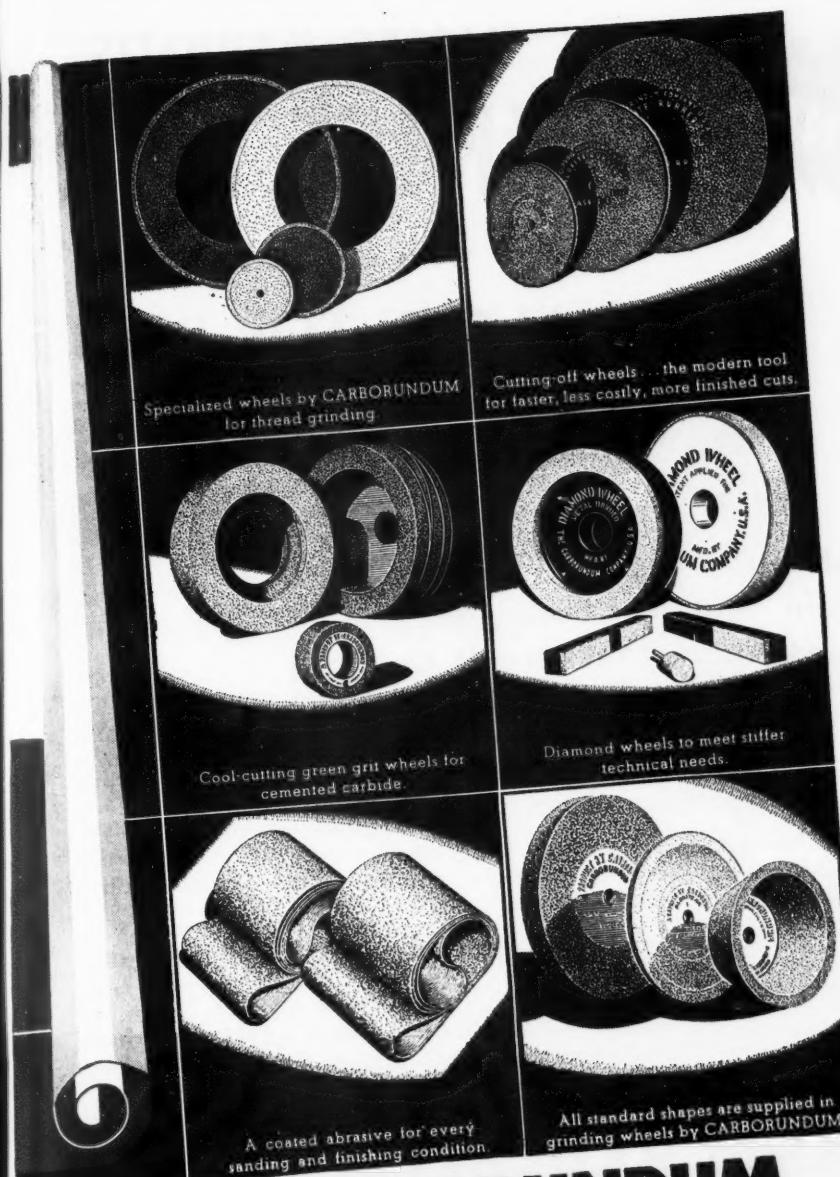


District Representation

Certain buyers of abrasives find the measure of their sources of supply in the local representatives of abrasive manufacturers. Therefore, it is a matter of great satisfaction to us to have men of ingenuity and experience representing us in key locations throughout the country. It is by means of our district organization that users are given direct access to the engineering, research, and wide scale technical activities of The Carborundum Company. It is their intelligent handling of abrasive problems, and their sincerity in serving customers' needs that makes every user think first of CARBORUNDUM, when they think of abrasives. The Carborundum Company, Niagara Falls, New York.



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Specialized wheels by CARBORUNDUM
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Cutting-off wheels... the modern tool
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Cool-cutting green grit wheels for
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ELECTRO-MAGNETIC

KNIFE BAR

with the exclusive

LAMINATED* TOP PLATE

*Pat. Pend.



**HANCHETT Leads the Field
Again With a Chuck That
Holds Knives "Where It Counts" . . .**

Another first in efficient magnetic work holding, this new knife bar will give you 22% more work area . . . enable you to hold knives firmly to the extreme edges of the chuck . . . resulting in better accuracy, more production.

It's ideal, too, for grinding many small pieces at an angle, the all-steel top plate giving more uniform distribution of holding power.

Two types available — an inexpensive bar without T-slots and the standard type.

**WRITE TODAY. Get the details on this new chuck
and Hanchett's full line of Magnetic Chucking
Equipment. Ask for bulletin 045-M12.**



HANCHETT MFG. CO.

MAGNETIC CHUCK DIVISION

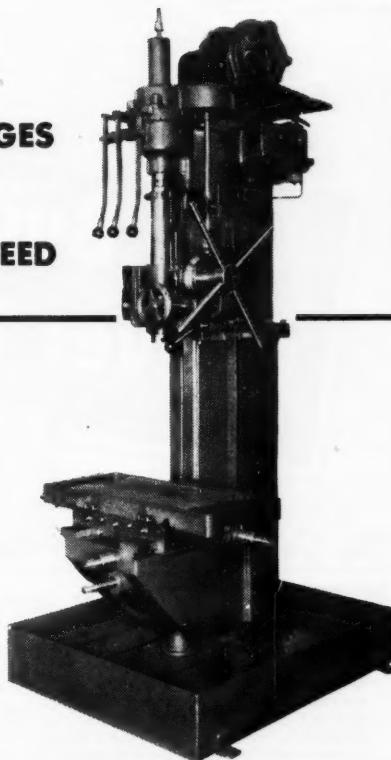
BIG RAPIDS

MICHIGAN



UNIVERSAL QUICK CHANGE DRILL

...with **12**
INSTANTANEOUS CHANGES
OF SPEED
AND WITH SELECTIVE FEED

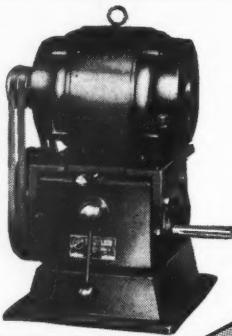


It's heavy, rigid and versatile... this Baker Drill of the Universal Quick Change type. Assures maximum out of twist drills up to $1\frac{1}{2}$ " diameter. Used for heavy duty boring and facing as well as for drilling.

Shown here is Model 150 with standard compound table. Speed and feed changes convenient to operator. Baker-built dependability ... engineered to do the job *better* and help *increase productivity*. Write for more details.

BAKER BROTHERS, Inc., Toledo, Ohio

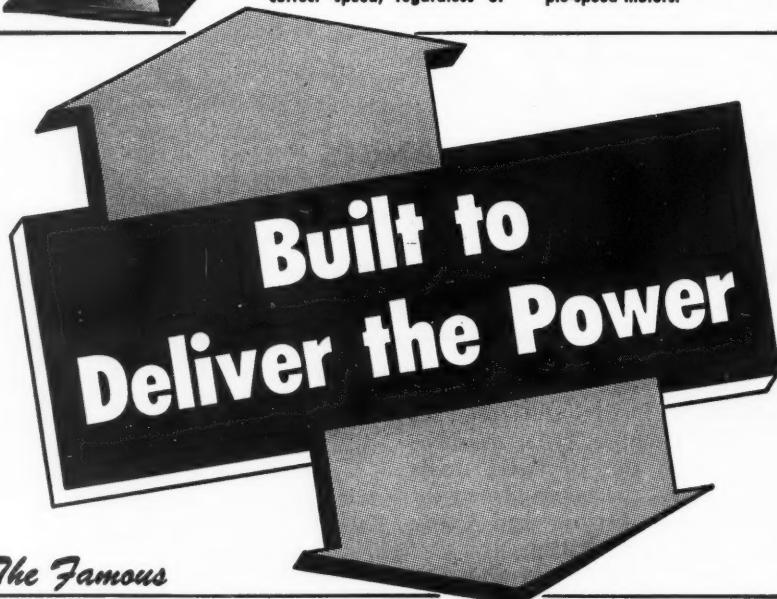
DRILLING, TAPPING, KEYSEATING and CONTOUR GRINDING MACHINES



The New TURNER Multi-Speed POWER UNIT

Power transmission FLEXIBILITY...now available for industrial applications. Where pre-determined speeds are needed, or in problems of speed production with multiple speeds, Turner has the answer. Just a flick of the wrist selects the correct speed, regardless of

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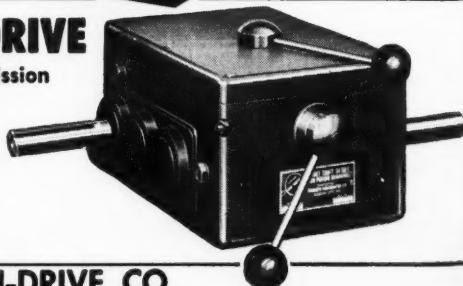


The Famous

TURNER UNI-DRIVE

Selective Sliding Gear Transmission

Make older machines more versatile. Operate each independently. Eliminate overhead line and counter shafts with Turner Uni-Drive! Save time, cut costs...3, 4, 6, 9 speeds to meet every need. Standard brackets for quick installation on lathes, shapers, screw, milling and hobbing machines, boring mills ...many others.



THE TURNER UNI-DRIVE CO.

(Sales Division, Turner Machinery Co.)

3416 Terrace Street Dept. 105 Kansas City 8, Mo.

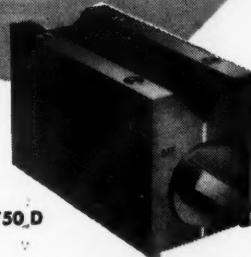
PERMANENT MAGNET CHUCKS

*... in a full range of sizes
for a wide range of jobs*

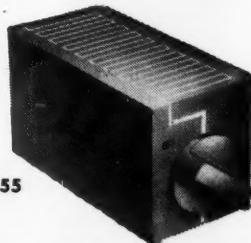
● These useful production and toolroom aids are saving time and money on hundreds of toolmaking, inspection and hand operations . . . also on light machine work and wet or dry grinding.

For sale only in the United States of America and its Territories. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

No. 750 D Magnetic V Block for holding iron or steel work of round or irregular shape. Capacity of V, $1\frac{3}{4}$ " diameter.



No. 750 D



No. 255

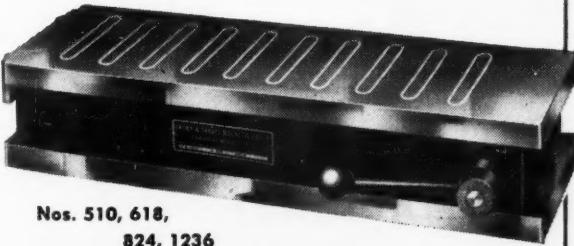
No. 9 R



No. 9 R Rotary Model Magnetic Chuck for grinding operations, light cuts on lathes and for other light machine operations. Designed to accommodate table clamps. Working surface 9" diameter.

Rectangular Models . . . for use on surface grinding machines and holding work for light cuts on planers, shapers and milling machines . . . also for other light machine operations. Small sizes for hand finishing operations (readily portable). Working surfaces from $5\frac{5}{8}$ " x $10\frac{3}{8}$ " to $12\frac{1}{8}$ " x 36".

We urge buying through the Distributor



Nos. 510, 618,
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- SAFE
- NO WIRES
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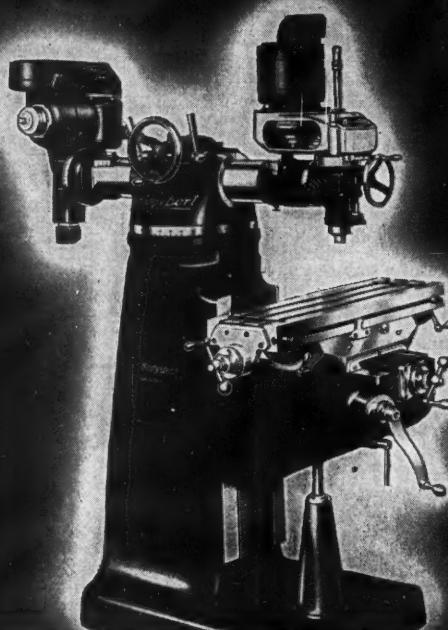
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Bridgeport

TURRET MILLING MACHINE

THE BRIDGEPORT TURRET MILLING MACHINE has won universal acceptance. It has proved a most valuable time and labor saver in the tool rooms and production departments of the largest plants. Its wide range and versatility in milling, drilling, boring and shaping enable it to serve as the complete central machine around which all operations revolve in many small shops.

It will pay you to explore the possibilities of the "BRIDGEPORT" in your plant.



BRIDGEPORT MACHINES, INC.
52 REMER ST. BRIDGEPORT, CONN.

E Even if we split the difference . . .



These new Speed-Wet Discs are cutting 5 to 1 Better!

Actually the field engineer's report stated 4 to 6 better! Here's the "before and after" comparison. The job: grinding stove frames. Previous production average: one frame per disc. New production rate with Speed-Wet Metalite Fibre Discs: 4 to 6 frames per disc. Purchasing agent instructed: furnish "Behr-Manning only" on all future disc requisitions.

Ever since we released the new Speed-Wet Disc, we have received glowing reports like this from the field. Technically, the explanation of this extra production lies in three quality features: first, all-resin bonding for resistance to heat; second, all-Durabonded® coating for rugged grit anchorage; third, all-fibre backing for extreme flexural strength.

Thus there is every possibility that a job test of Speed-Wet Discs on your own work will improve your production too. We'll be glad to arrange it at your convenience — just write us on your company letterhead.

4 Reg. U. S. Pat. Off.

BEHR-MANNING
(DIVISION OF NORTON COMPANY)
TROY, N. Y.



watch for
**SERVICE
PACKAGING**

Send your FORM-TOOL specs to J&S

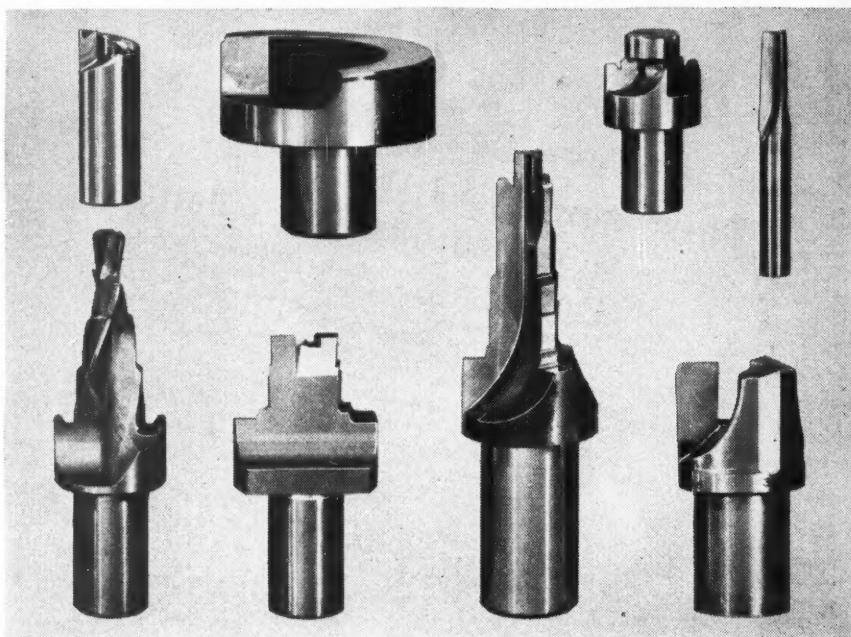
If you need form-tools in any quantity, it will pay you to use our form-grinding service. We do a large volume of this work for many of the leading manufacturing concerns.

Our wide experience has developed in us a "tool sense" that enables us to read between the lines of form tool specifications and "grasp the idea" behind them. J & S equipment of exclusive design, reducing man hours required to form-grind

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Among the form-tools we produce are: counterbores, cold-heading dies, countersinks, taper reamers, gun drills, flat drills, end cutters, boring tools, step drills, hollow mills, recess tools and combination tools. We also produce small form-tools for manufacturers of watches, clocks, meters and instruments.

Send us your form-tool specs for quotation.

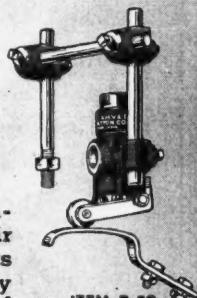
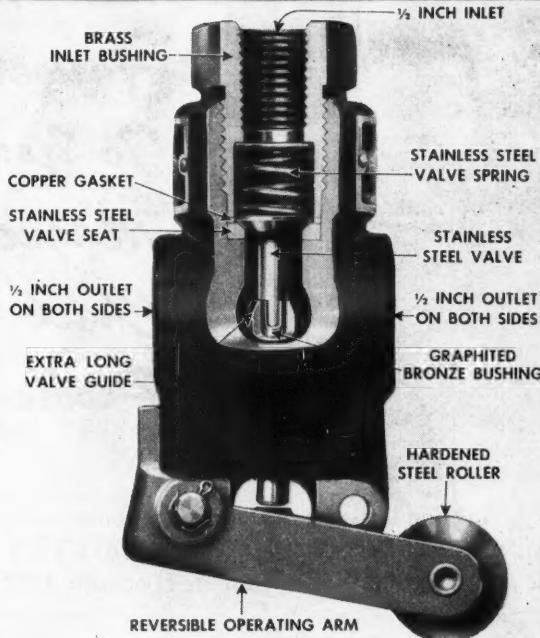


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471 Main Street, East Orange, N. J.
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INCREASE MACHINE TOOL EFFICIENCY with

Palmer-Shile AIR SAVER
Leak Proof
AIR VALVE



ITEM B-50

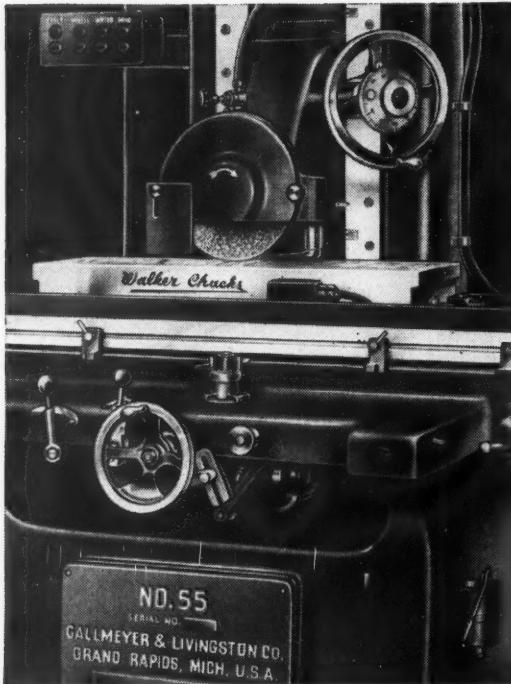
Complete Assembly
includes Valve,
Mounting Rods,
Operating Cam.

\$12.50

A real precision-built, leak-proof air valve that completely harnesses air power and assures split-second air control at all times. The easy-to-install Air Saver mounts in any position—operates at any angle—unaffected by vibration—provides ample air volume for operation of single or multiple jets. A natural where air is used for cleaning, drying, cooling, positioning or ejecting. Especially recommended around punch presses, die casting machinery, drill presses—and in reaming, broaching and other operations. *Immediate Delivery.*

Item B-100 (Valve Alone) \$10.00

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*Walker
Has The
Answer
To Your
Magnetic
Chuck
Problems*

Gallmeyer & Livingston insist on the best in the construction of their well-known machine tools . . . Therefore, WALKER 12" x 36" D. C. magnetic chuck for this Grand Rapids Hydraulic Feed Surface Grinder.

The trade-mark *Walker Chucks* is your guarantee of the best in magnetic chucks. Walker Chucks are tops in the low-cost high production program of many discerning manufacturers.

Hold Everything with Walker Chucks

O. S. WALKER CO. INC.

WORCESTER 6, MASSACHUSETTS

Original Designers and Builders of Magnetic Chucks



CENTRIFUGAL COOLANT PUMPS



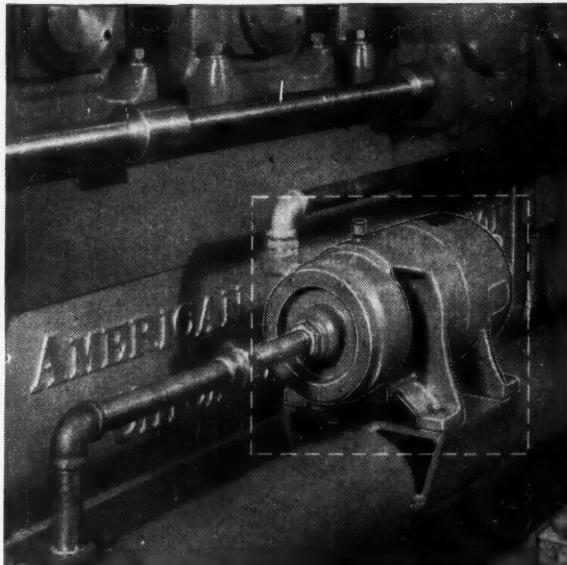
FULFLO

wishes you the compliments
of the season ★ ★ ★

GOOD CHEER
this Christmas

GOOD FORTUNE
throughout 1948

The Fulflo Model AG6M Pump is mounted on a heat exchanger in a tube mill manufactured by American Electric Fusion Corporation, Chicago.



Specialties Co., Inc.
BLANCHESTER, OHIO

Write on your letterhead for
FULFLO MECHANICAL DATA BOOK

NIAGARA

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1056

The modern appearance of these Niagara Presses is significant of the talent and experience responsible for their functional design. Motor, flywheel, clutch and all gears are enclosed within the frame. They are widely used throughout industry.

The advanced design of Niagara Underdrive Shears makes possible accuracy plus high output per hour. Strong, rigid bed, crosshead and housings eliminate the necessity for continually adjusting knife clearance for each thickness of sheets. No exposed rotating shafts, eccentrics or belts. Write for bulletins.

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PRESSES SHEARS

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DISTRICT OFFICES—NEW YORK • CLEVELAND • DETROIT

DISSTON METAL CUTTING BAND SAWS

In Types, Patterns, Tempers
for All Metals, All Speeds

HARDENED THROUGHOUT



Regular type for normal high speed cutting.



Reinforced type for heavy-duty, high speed cutting.

For high speed cutting of non-ferrous metals, plastics and many other materials. Made with Regular and Reinforced teeth in all standard dimensions. Also recommended for friction cutting of ferrous metals at speeds of not less than 12,000 f.p.m.

HARD EDGE, FLEXIBLE BACK



DISSTON U.S.A.

Buttress tooth pattern
for speeds of 3,000
f.p.m. and over.



DISSTON U.S.A.

Regular type for normal low speed cutting.

Hardened on tooth edge only. Teeth are milled (not punched) and accurately set by machine. Made with Regular type teeth for general metal cutting at low speeds; and with Buttress type teeth for machines operating at speeds of 3,000 or more f.p.m. . . . specially recommended for magnesium and aluminum alloys.

NEW! DISSTON Safety Reel



An improved design with added features. Supplied with all sizes of Hard Edge Flexible Back blades from $\frac{1}{8}$ " to $\frac{1}{2}$ " in coils of 100 feet.



RECOG. PAT. OFF.

For Better Metal-Cutting Tools
Ask for Disston Files . . . Hack
Saw Blades . . . Circular Saws . . . Carboloy
Fitted Circular Saws . . . Tool Bits.
Order from your DISSTON Distributor or write
direct for further particulars.

HENRY DISSTON & SONS, INC., 1221 Tacony, Philadelphia 35, Pa., U. S. A.
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SHELDON

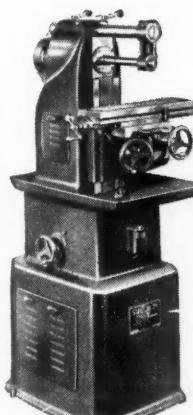
Makes All THREE!

These 3 precision machine tools are a necessary part of every completely tooled shop . . . a modern precision lathe with "Zero Precision" tapered roller bearings that will retain its extreme accuracy at new high operating speeds . . . a convenient backgeared shaper that embodies all major design improvements . . . a capable small milling machine that will do accurate work . . . all three are extremely moderate in price.

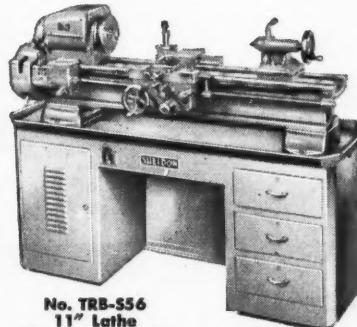
Write for Bulletins

SHELDON MACHINE CO. Inc.

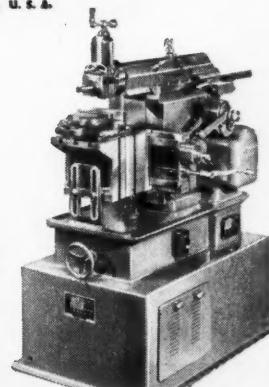
Manufacturers of Sheldon Precision Lathes • Milling Machines • Shapers
4250 N. KNOX AVENUE • CHICAGO 41, ILLINOIS, U.S.A.



No. 3000A
Size "0"
Milling Machine



No. TRB-S56
11" Lathe
1" Collet Capacity



No. 8000
12" Shaper

DUST FREE ROLLERS IN A NEW FLANGED TYPE SELF-CONTAINED ROLLER BEARING



Roller Bearing Pillow Block—Cast Iron Body



Roller Bearing Flanged Pillow Block



Flanged Roller Bearing

HEIM

FLANGED TYPE SELF-CONTAINED ROLLER BEARING

Whether used as a pillow block or applied directly as a roller bearing, the Heim Roller Bearing is a self-contained unit of flanged construction which is extremely simple to install. Dust and foreign matter is effectively excluded and lubrication is efficiently retained.



Heim also makes:
Unibal Spherical Bearings
Rod Ends
Die Polishing Machines

Roller Bearing Pillow Block



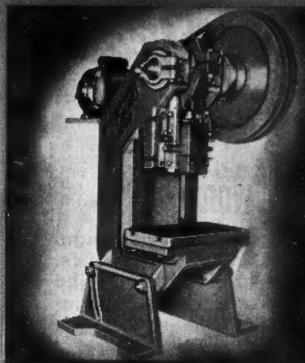
THE HEIM
FAIRFIELD

COMPANY
CONNECTICUT

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PUNCH PRESSES

5 & 10 TON CAPACITY
BENCH PRESSES

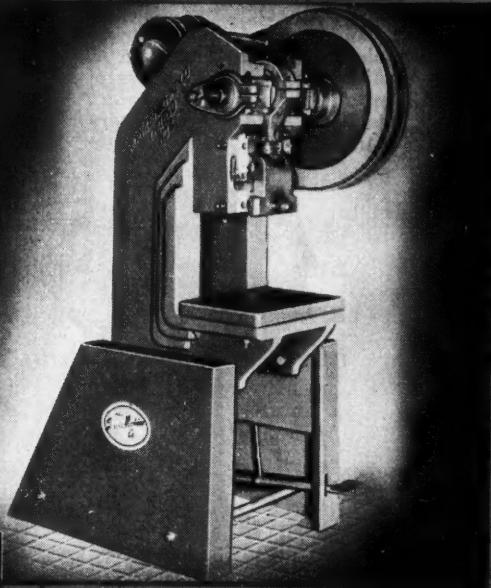


These Presses were designed to provide strength, accuracy, speed and endurance.

5, 10, 15, &
25 TON O.B.I.
FLOOR MODELS

These models will handle any requirements within their capacities for stamping, blanking, forming and any other high speed operations.

These new A series Presses have been developed due to the demand for a better and ordinary Bench Press, and retain all the sturdy characteristics of their predecessors with added safety, speed, strength, and ease of operation and maintenance.

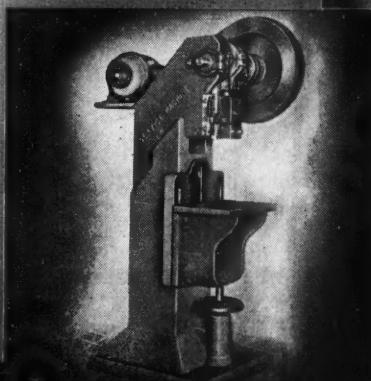


15 TON
HORN PRESS

This Press is performing a wider variety of jobs which until recently were not thought of as Press operations.

The predominant feature is the adjustable bed which can be raised or lowered to the required die space.

The bed can be easily removed for the use of horn dies.



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Rousselle
PUNCH
PRESSES

THE FIRST AND LAST WORD IN ELECTRICAL TOOLS

United States Electrical Tools

THE FIRST WORD

because the original electrical tools invented by Col. John A. Smith were the beginnings of the industry fifty years ago . . . this is our Golden Anniversary Year.



UTILITY FLOOR GRINDER

Model 500

Ball Bearing — 12, 14 and 18" wheels.
Totally enclosed motor push button starter
for overload protection, ball bearings en-
closed in dust-tight housings, enclosed
adjustable wheel guards.

THE LAST WORD

in precision engineered design,
construction and performance,
constantly improved to fit the
manifold demands of all in-
dustry.

YOUR JOBBER CAN SUPPLY YOU

Tools and accessories are carried in stock by the most dependable jobbers in your area . . . their salesmen can help you select the proper tool for the job, as well as thousands of other items. Buy from your local jobber and enjoy his convenient, economical service.



The UNITED STATES ELECTRICAL TOOL Co.
CINCINNATI, OHIO

CUT HIGH-SPEED STEEL TOOL COSTS



High-Speed Steel Tools, Cutters, Broaches, etc., of molybdenum, tungsten and cobalt are given longer useful life when hardened the Sentry Way with the Sentry Diamond Block Method of controlled atmosphere. Advantages are maximum hardness, uniform quality, no scale, no decarburization, bright finish, dimensions and shape maintained and finishing operations eliminated. One unskilled operator can tend several furnaces.

Sentry Electric Furnaces are quick to heat, economical to operate, flexible, clean. There are horizontal and vertical models in sizes to meet your needs.



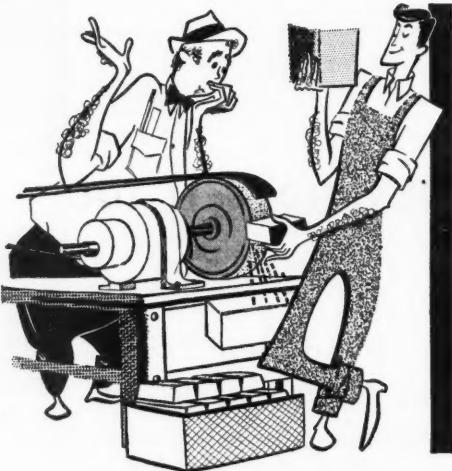
Write for new 12-page descriptive catalog. Ask for bulletin 1054-E5.



The Sentry Company

FOXBORO, MASS., U.S.A.





"Look, Hotchkiss! We replaced set-up wheels with Armour belts to increase production, not to help you keep up with the Book of The Month!"

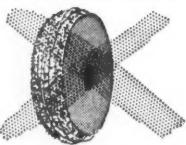
WHY USE COATED ABRASIVE BELTS?



No glue to mix!



No wheels to dress!



No uneven surfaces!

They grind Faster, Better! The urgent need for faster, better production is responsible for the conversion to the abrasive belt backstand method of grinding and polishing from the old set-up method. Coated abrasive belts when worn take 75% less time to replace than is needed to dress a wheel. They reduce inventory problems due to elimination of wheels, glue, cements and various grains.

They are More Accurate! Accuracy of the work never varies regardless of the wear on the belt. Furthermore, these coated abrasive belts greatly reduce the danger of discoloring, warping and flowing caused by frictional heat.

They are More Economical! Abrasive belts do not require trained personnel needed to dress set-up wheel. They also improve quality of work with less operator fatigue, thus boosting production while lowering costs.

Armour's uniform-factory-made abrasive belts are only part of Armour's complete line of abrasives designed especially to give you better performance, longer wear, greater economy. Come and talk over your grinding and polishing problems with Armour's technical representatives.

ARMOUR and Company



Coated Abrasives Division

1355 WEST 31ST STREET • CHICAGO 9, ILLINOIS



STOP...

CORROSIVE MOISTURE AND
OIL EMULSION
DESTRUCTIVE DIRT, RUST
AND PIPE SCALE



Norgren Transparent Bowl Filter, with exclusive features, gives operator absolute control over moisture and oil emulsion not stopped by conventional filters.

- **TORNADO JET** imparts swirling motion to air, separating and throwing moisture against outer wall.
Baffle plate divides bowl into two zones . . .
- **ACTIVE ZONE** where separation takes place.
- **QUIET ZONE** where muck collects instead of being driven along by air turbulence, double Monel wire screen stops all solids.
- **TRANSPARENT BOWL** permits operator to see all action . . . tells him when bowl needs draining.

Write C. A. Norgren Co.
222 Santa Fe Drive, Denver 9, Colo.

Norgren



HOLIDAY GREETINGS

With the approach of the Holiday Season we like to turn our minds from business cares and give personal thought to customers and friends who have so loyally contributed their part to make the year pleasant and profitable. To them now we extend sincere Holiday greetings with the old-time wish that they may enjoy the merriest of a Merry Christmas and the happiest of a Happy New Year.

THE WELDON TOOL CO.

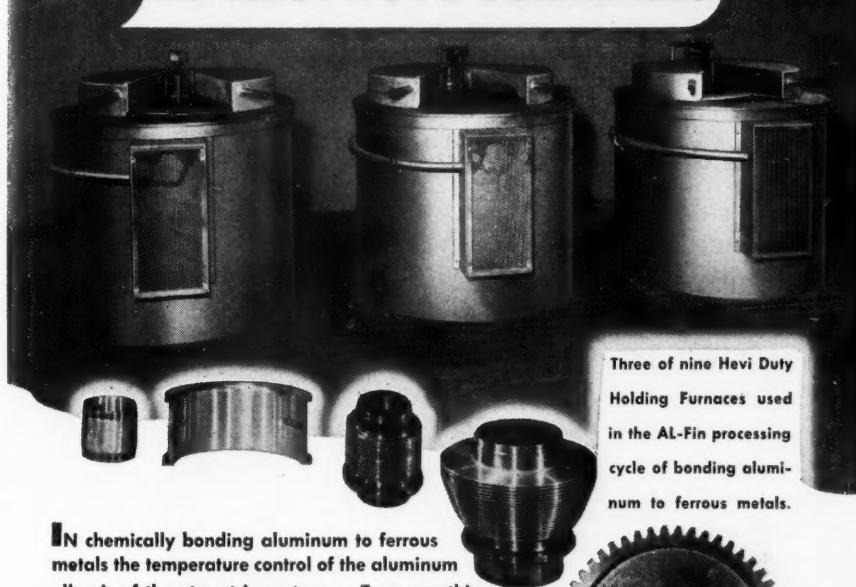


3000 WOODHILL ROAD

*Cleveland 4,
Ohio*

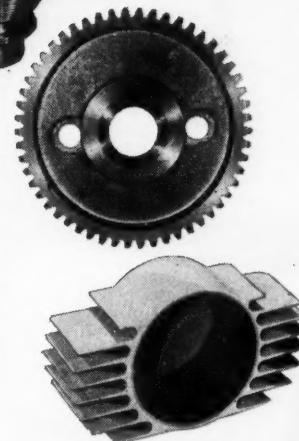
THE AL-FIN PROCESS

AND HEVI DUTY FURNACES



Three of nine Hevi Duty Holding Furnaces used in the AL-Fin processing cycle of bonding aluminum to ferrous metals.

In chemically bonding aluminum to ferrous metals the temperature control of the aluminum alloy is of the utmost importance. To assure this necessary accuracy the AL-Fin Corporation of Jamaica, New York, use 9 Hevi Duty Electric Holding Furnaces. A few of the AL-Fin bimetallic assemblies are pictured, such as aluminum timing gear with bonded-in steel hub, aluminum lined steel bearings and bushings and aluminum bonded finned assemblies. Many of the outstanding metallurgical developments of recent years, such as the AL-Fin Process, have used Hevi Duty Electric Furnaces in original development and subsequent production. A series of furnace bulletins detailing types, sizes and applications of the Hevi Duty line is available — send for them today.



HEVI DUTY ELECTRIC COMPANY

HEAT TREATING FURNACES **HEVI DUTY** EXCLUSIVELY
MILWAUKEE, WISCONSIN

PRODUCTION NEWS!

a new era in shaft-turning

The new BULLARD MAN-AU-TROL HORIZONTAL LATHE
Model 30H produces three identical parts at once...
with interchangeable manual or automatic control!





In the same time now devoted to shaft-turning, grooving, facing, angle-turning or between-center chucking jobs, you can multiply your present output with the new BULLARD Man-Au-Trol 3-Spindle Horizontal Lathe—and reduce costs proportionately.

That's because this latest BULLARD machine has many improvements that give you better workmanship and big savings in time and money.

No Other Shaft-Turning Lathe

Offers All These Advantages

All 3 spindles are equipped with hydraulic, centering-type, lever-gripping chucks.

All machine-operating controls are located at operator's right.

Each hydraulic chuck is operated by an individual foot-treadle, allowing operator unrestricted use of both hands.

Both saddle and tool slide travel on vertical bearing ways, entirely free of the chip area.

An automatic feed interrupter breaks the chips to desired lengths for easy removal from the chip receiver.

Vertical construction of saddle and saddle ways allows chips to fall freely into receiver without accumulating around operating parts.

Work and tools are always visible and easily accessible to the operator without reaching across tool slide and tools.

Massive weight and firm application of all components provide extreme rigidity, assuring minimum vibration and maintained accuracy.

Plus the Advantages of BULLARD MAN-AU-TROL

Man-Au-Trol, the automatic control that is as versatile as manual control, has proved on other BULLARD lathes its amazing ability to cut production time and costs. Controlling the head through 39 separate functions in any sequence, it lets the machine cut practically continuously . . . while the operator merely loads, supervises and unloads.

Built into this new BULLARD machine, it allows manual control for short runs and quick conversion to 100% automatic operation for long-run production of 3 identical parts at once . . . substantially lowering manufacturing costs.

Why not find out how this revolutionary, cost-saving combination can benefit your own production? Engineering data and other facts on the new BULLARD Man-Au-Trol 3-Spindle Horizontal Lathe gladly sent on request. THE BULLARD COMPANY, Bridgeport 2, Connecticut.



TO MAKE MACHINES DO MORE



In actual use

KELLER CARBIDE BURS give up to 7500% more service

Careful records kept by users themselves prove that P&W Keller Carbide Burs outlast even high speed steel as much as 75 to 1. Here's why:

TRUE RUNNING—Keller Carbide Burs are *machine ground* from the solid. This assures uniform flute spacing and flute depth... makes each bur identical... results in far smoother operation...greatly reduces "chipping out" tendencies. Only machine ground accuracy will give "*true running*" results. Hand ground burs can only approximate them.

NO BREAKAGE AT SHANK—A special method of joining the carbide bur body to the steel shank prevents breakage at this point. This involves not only the brazing method, but the design of the joint.

WET GRINDING—Pratt & Whitney Keller Burs are machine ground under a stream of coolant which prevents surface cracks caused by overheating when dry ground. This also permits use of finer grinding wheels giving a smoother finish.

Write for "Burology," the story of the science of burring, and the P&W Bur Catalog.

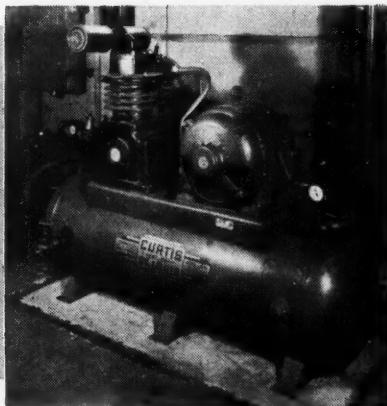
PRATT & WHITNEY
Division NILES-BEMENT-POND COMPANY
KELLERFLEX SALES DEPARTMENT
WEST HARTFORD 1, CONN.



**Presstite
Engineering Co. Says**

CURTIS AIR COMPRESSOR

**"Completely satisfactory
in 24-hour service"**



In the plastic division of Presstite Engineering Co., St. Louis, this Curtis Air Compressor is the sole source of air—and because compressed air is essential to all types of plastic extrusions, dependability is all-important. Operating continuously 24 hours a day, this Curtis Compressor has given "completely satisfactory service."

This is another example of a nationally known manufacturer relying upon Curtis Compressors for a dependable, economical supply of air. Curtis features that contribute to their excellent record of performance, long life and low maintenance include:

- Timken Bearing Equipped
- Positive Unloaded Starting
- Automatic Electric Welded Tank
- Precision Built Throughout
- Self Oiling

Write for full information on Curtis Air Compressors from $\frac{1}{4}$ h.p. to 50 h.p. for every industrial use. Ask for Form C-7 on Curtis Air Compressors, Air Hoists, and Air Cylinders.

CURTIS PNEUMATIC MACHINERY DIVISION
of Curtis Manufacturing Company
1913 Kienlen Avenue, St. Louis 20, Missouri

93 Years of Precision Manufacturing

HANNIFIN

Many Different Models!

Hannifin builds hydraulic riveters for assembly operations on a wide variety of work: automobile and truck frames, structural steel, railroad car underframes and bodies, steel floor gratings, construction machinery beds and frames, automobile brake drum housings, ring gear assemblies. Specially designed yokes for handling "hard-to-get-at" work. Reach up to 6 feet. Hannifin "Hy-Power" units are also available for high speed punching, pressing, crimping, and shearing operations. Ask for a copy of Bulletin No.53-I.



HYDRAULIC *Hy-Power* RIVETERS

Time-Saving Production Tools

By doing in seconds work that would ordinarily take minutes, Hannifin "Hy-Power" Hydraulic Riveters pay for themselves! If you have a production problem, you can depend on Hannifin to help you increase output, cut costs, AND DO A BETTER JOB! The Hannifin noiseless "hydraulic squeeze" action can't be beat for turning out a perfect rivet every time, using either cold or hot rivets. Hannifin "Hy-Power" units come to you complete with automatic hydraulic pressure generator—READY TO GO TO WORK. Ask for recommendations.



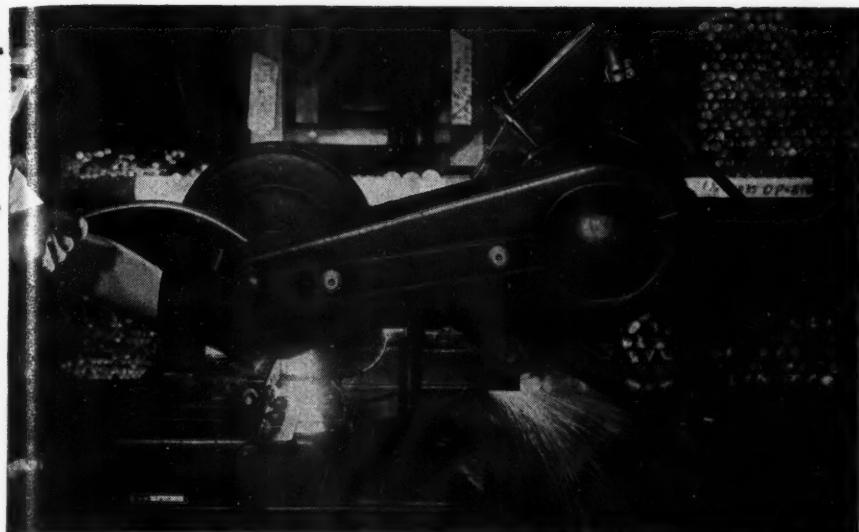
HANNIFIN CORPORATION

1101 SO. KILBOURN AVE., CHICAGO 24, ILL.

Air Cylinders
Pneumatic Presses

Hydraulic Cylinders
Hydraulic Riveters

Hydraulic Presses
Air Control Valves



Let MANHATTAN solve your perplexing cut-off problems

Recent developments in both rubber and resinoid bonds have greatly increased the number of cuts per wheel, as well as improving the quality of cut.

MANHATTAN wheels are being used satisfactorily on ferrous and non-ferrous castings, steel bars, pipe, structural shapes, stone and reinforced concrete; also on light gauge tubing, hardened or soft steel, delicate alloys, ceramics and glass.

The following data picked at random from our files show results obtained with 10" diameter wheels on Delta Machines:

Material	Wheel Grade	Cutting Time	Number of Cuts
Dry Cutting			
3/4" Dia. Steel	#211	3 Sec.	350
3/4" Steel Pipe	#213	1½ Sec.	350
Angle Iron, 1½" x 1½" x 1/8"	#213	2½ Sec.	400
Shelby Tubing, 1" dia.—17 gauge	#479	1½ Sec.	228
Wet Cutting			
3/4" Dia. Steel	#479	4 Sec.	275
3/4" Steel Pipe	#479	2½ Sec.	252
Shelby Tubing, 1" dia.—17 gauge	#479	2 Sec.	337
1/4" Bundyweld Tubing	#548G	½ Sec.	2090*

*Average on 50 Wheels

ABRASIVE WHEEL DEPARTMENT

RAYBESTOS-MANHATTAN INC.



Keep Ahead with Manhattan

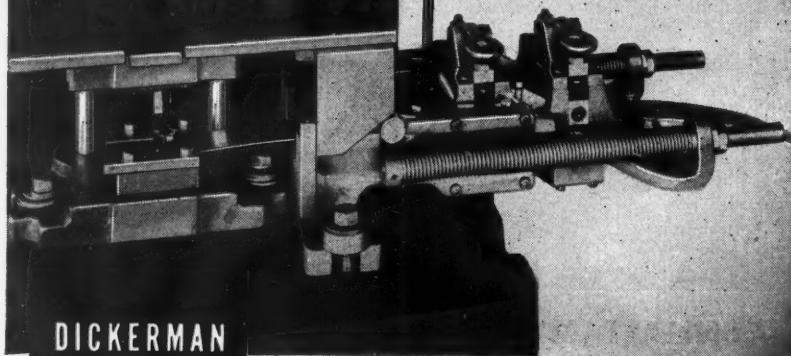
MANHATTAN RUBBER DIVISION

PASSAIC, NEW JERSEY

A PRODUCTO

TIMELY

COST CUTTING AID



DICKERMAN
automatic
DIE
FEEDS

Punch Press Feeding Simplified

If you appreciate the factor of human error . . . as you do! And the cost of die repairs and wasted material . . . then you need automatic Dickerman Die Feeds that require no motor, no connection with the power shaft of the press. Used with Producto Die Sets they form a combination that will give years of trouble-free operation, feeding all coiled stamping materials, up to $\frac{3}{16}$ " thick — 6" wide, accurately, without jams. Installed in any position for any style die. Call "Near Neighbor Service" for Bulletin.

EXCLUSIVE DISTRIBUTOR FOR DICKERMAN AUTOMATIC FEEDS

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THE PRODUCTO MACHINE COMPANY

960 Housatonic Ave. • Bridgeport 1 Conn. • Tel. 4-9481

MEAD Presents These New Money-Saving AIR OPERATED DEVICES



AIR PRESSES

Besides the standard, ready-made fixtures for the application of Air Power, (such as the Air Press, Air Vise, Air Chuck, Air Clamp) Mead offers a wide selection of air cylinders, which can be used in special jigs and fixtures. Illustrations show four types of double-acting cylinders, which can be furnished in five different bores with optional length of stroke.

USE MEAD AIR POWER

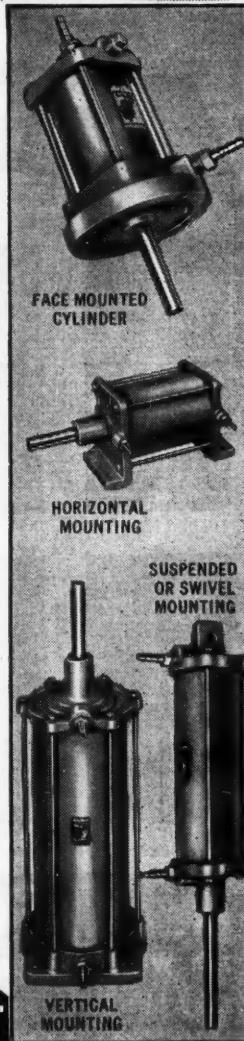
Get faster, more economical production set-ups—investigate the entire "family" of Mead Air-Operated devices. Hundreds of progressive factories now use them to do better, faster, more economical jobs. Do you want to move things—lift them, slide them, tilt them—or hold them firmly? Mead Air Power will do it. Do you need a delicate, flexible touch—or tremendous pressure? Mead Air Power has them both. If you are interested in saving time, money and man-power now and for the future, investigate Mead Air-Operated devices now.

**CATALOG
READY**



**MEAD
SPECIALTIES
COMPANY**

4114 NORTH KNOX AVENUE
DEPT. AA-127, CHICAGO 41, ILL.



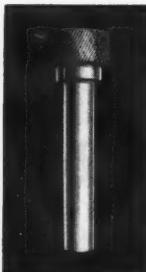
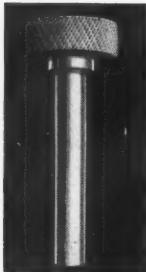
Announcing the NEW

FORD

CARBIDE GRINDING

BURS

Precision-ground on special machines insuring uniform and accurate tooth shape and tool concentricity which gives maximum cutting efficiency—



USES

Developed for internal grinding, jig grinding, blending and fine finishing by off-hand grinding on hardened steels.

PERFORMANCE

Greatly improved performance as compared to abrasive wheels — faster material removal — finer finish — ability to hold hole shape and tolerances without dressing or set up adjustments — no loading, works equally well on soft materials or steels hardened to 65 Rockwell C.

SPEEDS

Operation in standard precision grinding equipment at conventional grinding speeds of 2000 - 5000 surface feet per minute is recommended.

Available in standard sizes with $\frac{1}{4}$ " wide cutting face. Tool diameters $1/16$ " to $\frac{3}{4}$ " and shank diameters $\frac{1}{8}$ " to $\frac{1}{4}$ ".

Over 25 years Ford skilled workmen have produced quality rotary files in hundreds of shapes and sizes, made of hardened tool steel and carbide. Let us send you our complete catalog.

M. A. FORD MFG. CO. INC.

744 West First Street

HAND CUT FILES, GROUND BURS, CARBIDE CUTTERS AND GRINDING BURS

Davenport, Iowa

South Bend 9" Precision Lathes



**Quality-Built for
Quality Work**

9" x 3' South Bend
Model A Bench Lathe

SWINGS—9½" over bed and saddle wings

BED LENGTHS—3, 3½, 4 and 4½ feet

**DISTANCE BETWEEN CENTERS—
16 to 34 inches**

SPINDLE SPEEDS—

Six—41 to 658 r. p. m.

Twelve—41 to 1270 r. p. m.

Sixteen—46 to 1176 r. p. m.

POWER LONGITUDINAL FEEDS—

Model A Lathes—48,.0015" to .0853"

Model B Lathes—26,.0021" to .0155"

Model C Lathes—14,.0021" to .0156"

POWER CROSS FEEDS—

Model A Lathes—48,.0004" to .0252"

Model B Lathes—23,.001" to .0046"

THREAD CUTTING RANGE—

Model A Lathe—48 pitches,
4 to 224 per inch

Models B and C Lathes—45 pitches,
4 to 160 per inch

MAXIMUM COLLET CAPACITY—½ inch

The quality that is built into South Bend 9" Precision Lathes enables them to produce quality work with efficiency under all conditions. Regardless of the type of machining—between-centers, collet, fixture, or chucking—close tolerances can be maintained and a maximum volume of fine work produced with a minimum of effort.

Write for Catalog 9-J which fully describes and illustrates all South Bend 9" Precision Lathes and attachments.

SPEED PRODUCTION WITH THESE ATTACHMENTS

COLLET ATTACHMENTS

HANDLEVER BED TURRET

TAPER ATTACHMENT

DOUBLE TOOL CROSS SLIDE

MILLING ATTACHMENT

SQUARE TURRET

ELECTRIC GRINDER

CENTER REST

CARRIAGE STOPS

FOLLOWER REST

BUILDING BETTER LATHES SINCE 1906

SOUTH BEND LATHE WORKS

427 EAST MADISON STREET • SOUTH BEND 22, INDIANA

SAVE LABOR

with

T-J CYLINDERS

- ★ SIMPLIFY MACHINES
- ★ SAVE OPERATIONS
- ★ DO PUSH-PULL-LIFT JOBS

Automatically!



More and more today—industry is saving labor by applying T-J Air and Hydraulic Cylinders to operations of all kinds where pushing, pulling, lifting or mechanical control is needed. Available in many standard sizes and styles... 100 lb. or 50,000 lb.... both cushioned and non-cushioned types. Backed by 30 years of know-how... T-J engineered to do the job better and cut costs! Write today for catalogs.

The Tomkins-Johnson Company, Jackson, Mich.

FOR TOUGH JOBS SPECIFY

T-J

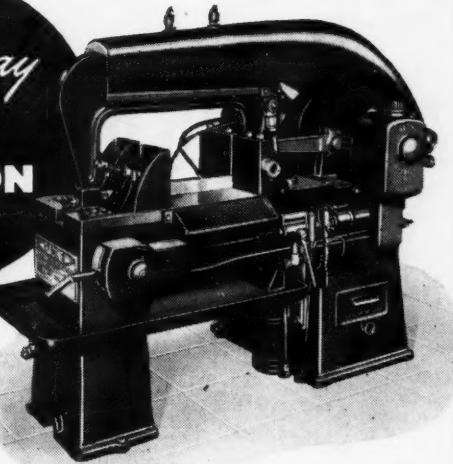
TOMKINS-JOHNSON

RIVITORS... AIR AND HYDRAULIC CYLINDERS... CUTTERS... CLINCHORS

Heres a sure way

TO REDUCE HIGH PRODUCTION COSTS

Consider the savings possible with late model RACINE Machines. Cutting off work is the first operation in any production schedule. RACINE Machines cut fast and accurately, saving money at the start and on subsequent machining operations.



Hydraulic feed and pressure control assure the maximum depth of cut with each stroke of the machine, without overtaxing the blade. Moving parts are reduced to a minimum, saving horsepower and lowering maintenance expense. Dual feed, positive and flexible, provides proper application of the blade in every class, grade and shape of material.

Ask RACINE Engineers for recommendations on equipment to lower cutting costs in the stock you use. Free catalog No. 12 and data sheets without obligation. Write today. RACINE TOOL AND MACHINE COMPANY, 1770 State Street, Racine, Wisconsin.

EXTRA FEATURES THAT COST NO MORE

- SINGLE LEVER CONTROL — No experience required to operate a RACINE saw. All phases of operation are centered in one, simple fool-proof control lever.
- STRAIGHT LINE CONNECTING ROD PULL—Direction of saw frame movement and connecting rod pull are in the same plane and parallel at any height of the saw arm.
- HYDRAULIC OPERATION — Hydraulic pressure carries the blade downward throughout the cutting stroke. Cutting feed is applied progressively and is adjustable to the stock and shape to be cut.
- PIVOT ARM CONSTRUCTION — Operating pressure is taken directly by saw frame slide bearing* and by non-rotating pivot bearing.

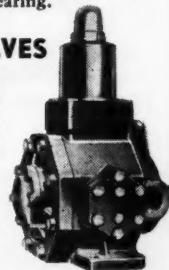
RACINE Oil Hydraulic PUMPS AND VALVES

For the operation and control of any power movement required for lifting, bending, shearing, pressing, holding, stamping, etc. Pumps are Variable Volume design, capacities 12 to 30 g.p.m. Pressures 50 to 1000 p.s.i. RACINE Sleeve Type Valves in $\frac{3}{8}$ " to $1\frac{1}{2}$ " sizes. Write for Catalog P-10-C.



RACINE

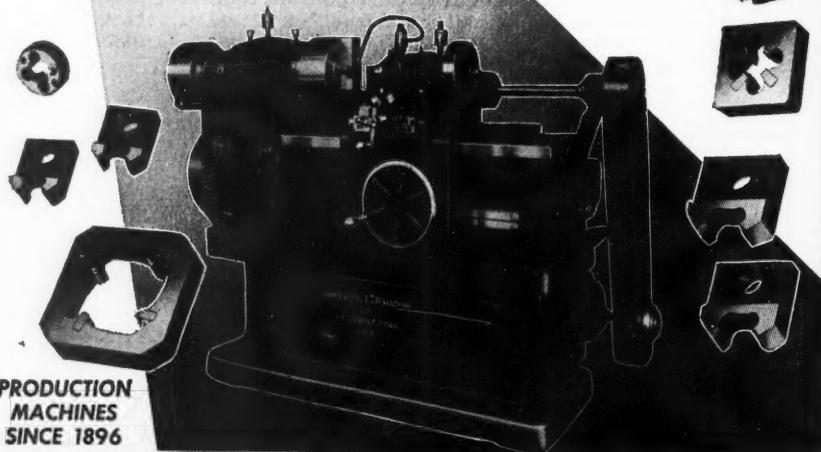
STANDARD FOR QUALITY AND PRECISION



* 4 BIG REASONS WHY the Standard COULTER "HT" Thread Milling Machine IS THE MACHINE FOR YOU!

- ★ Any number of Lands eccentric or con-eccentric relief can be produced. Dies from $\frac{3}{8}$ " up to 2"
- ★ Equipped to give cutter speeds with infinite changes from 100 RPM to 650 RPM
- ★ Can thread round, square and inserted chaser dies
- ★ The most economical of ALL threading machines

Write for Full Particulars



The James **COULTER** Machine Co.
BRIDGEPORT • CONNECTICUT • U.S.A.



BUCKEYE
"Lubrico"

Exceptional Quality HIGH LEAD BEARINGS

THAT COST LITTLE MORE THAN BEARINGS OF STANDARD ANALYSIS

FOR PRECISION airplane parts, pumps, seal rings, important high speed shafts, and in other places where bearing failure would involve critical delays use Buckeye Lubrico Bearings. They combine a reduced coefficient of friction, excellent conformity to overcome slight shaft misalignment, qualities of self lubrication, good resistance against pounding, and the ability to withstand heavy shock without cracking.

Manufactured from selected metals

under Buckeye's exacting laboratory and metallurgical control, these bearings have uniform dispersion of lead throughout. They are free from porosity, and accurately dimensioned assuring speedy, easy assembly. Furnished in any of our 1088 stock sizes or to customers ID, OD and length; slotted, drilled, flanged or threaded exactly to blue-print, in three different metal analyses, for light, general, and extremely heavy duty services. Let us quote on your requirements.

Buckeye
BRASS AND MANUFACTURING COMPANY
BRONZESMITHS SINCE 1900

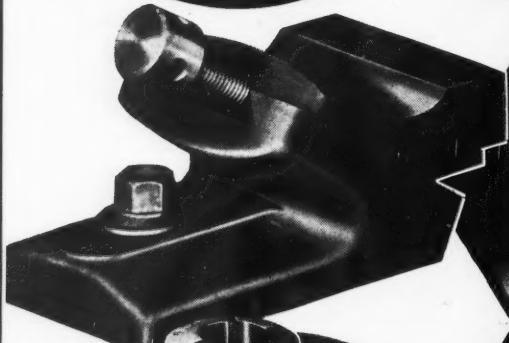
6412 HAWTHORNE AVE.

CLEVELAND 3, OHIO

BRONZE SLEEVE BEARINGS • STANDARD SIZES OR TO CUSTOMERS' BLUEPRINT
IN ANY RECOGNIZED BEARING METAL ANALYSIS

PRODUCTION

Accessories to Lower COSTS



THREAD TOOL

Mounts on any screw cutting lathe and replaces single point thread tools and chasers. Index system presents each of ten cutter teeth successively to the work allowing maximum cuts to produce a perfectly formed thread. Duplicate threads without gauging. Write for Bulletin 11.

LOCKJAW

New all purpose work clamp eliminates expensive bolting operations on millers, planers, grinders and drills. Stops work heaving, shimmying, yawning and buckling with sure-grip, locking pressure forward and downward. Write for Bulletin 10.

COLLETS

Lathes, milling machines and other tools readily be equipped to use Rivett draw-in collets and step chucks. This self-centering, convenient method of chucking reduces time and increases precision on tool-room and production work. Write for Bulletin 100.

RIVETT

RIVETT LATHE & GRINDER, Inc.

BRIGHTON • BOSTON • MASS. • U.S.A.

Fast, Efficient, Economical Production of...

IF you're looking for fast, accurate production of these machining operations, it will pay you to investigate AUTO ENGRAVER equipment. Precision made in all respects . . . they'll do a real job.

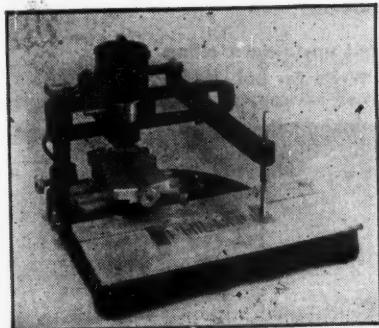


Model
CC-3D

PHILBRO "CONTROL-CUT" 2 and 3 Dimensional MILLING • PROFILING ENGRAVING

\$750
F.O.B., N.Y.

SIMPLE TO OPERATE



Pantograph Controlled ENGRAVER

Model PE-1. Widely used for rapid commercial and industrial production engraving of all machinable metals, wood, plastics, ivory, etc. • Built of the finest material and precision made in all details. • Does not require skilled operator. • Easily regulates depth of cuts. • Engraves area 5 x 5 and larger by resetting work and on curved surfaces without special templates.

\$350

- MILLING
- BORING
- DRILLING
- PROFILING
- ENGRAVING
- ROUTING

and similar precision
machining operations

A 2 and 3-dimensional cutting, milling or engraving machine designed to reproduce any required shape, line or contour from an enlarged master template. The "Control-Cut" now makes production of Blanking Dies, Templates, Molds, Milling irregular slots, contours, parts of machines, or instruments, or any 2 or 3-dimensional metal removal operation simple, fast and inexpensive. Fully ball bearinged, 3 spindle speeds, variable ratio pantograph from 2:1 to 4:1 and intermediate ratios.

Portable PANTOGRAPH ENGRAVER

Model CC-2A A precision industrial engraver that does not require skilled operators. Designed for rapid, accurate engraving of letters, designs, small panels, name plates and parts, and experimental work in the lab. Pantograph arms permit easy control of machine; adjustable control determines depth of cut. Engraves brass, steel, aluminum, \$300
ivory, wood and all types of plastics.....

\$300

ALL PRICES F.O.B. N. Y.



Model
PE-1

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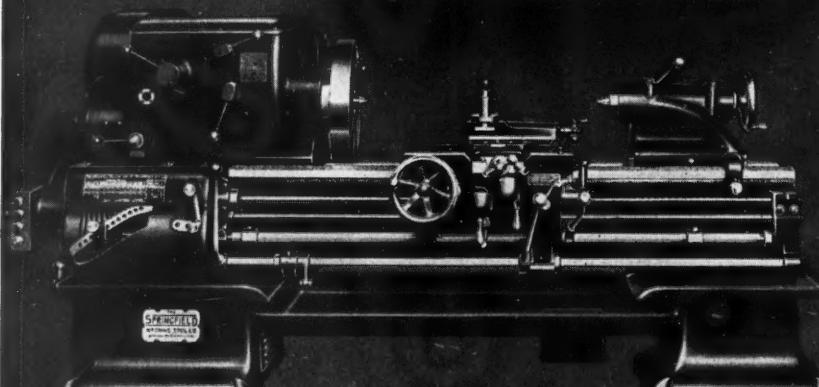
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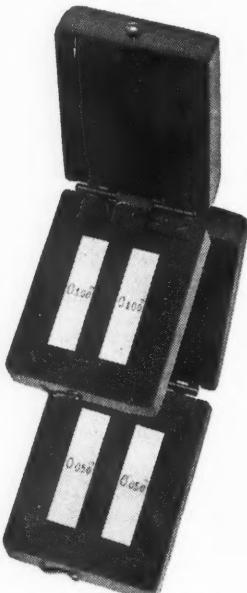
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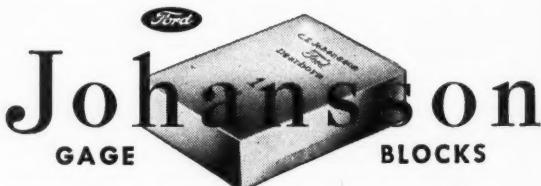


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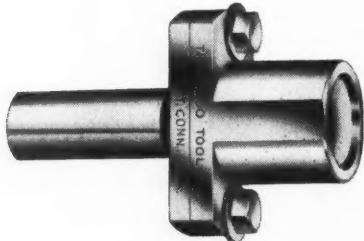
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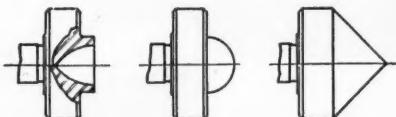


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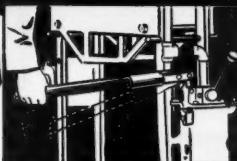
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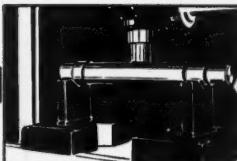
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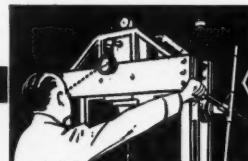
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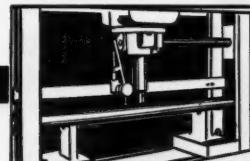
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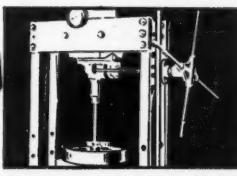


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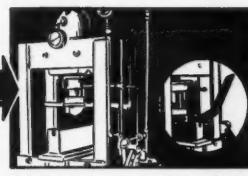


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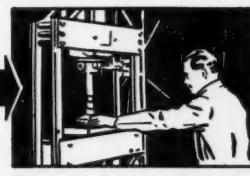
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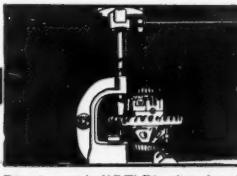
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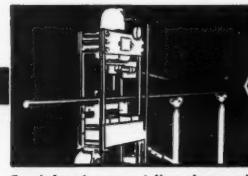
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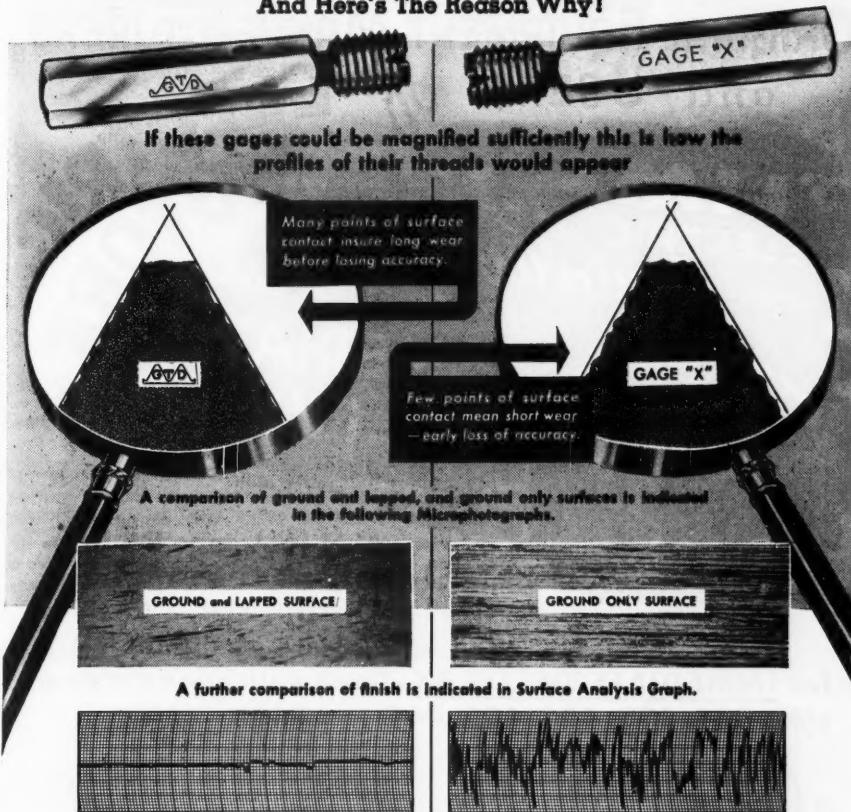
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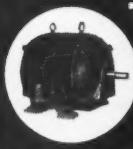
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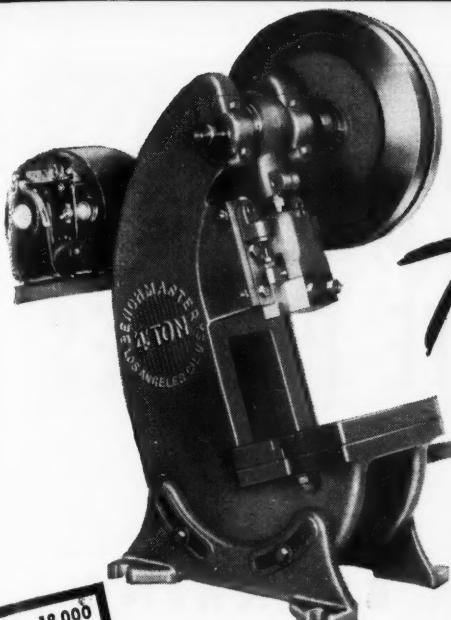
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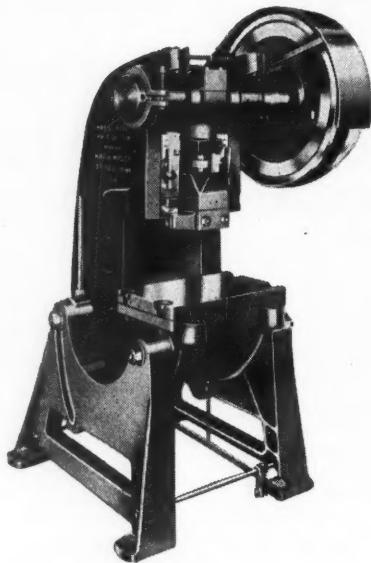
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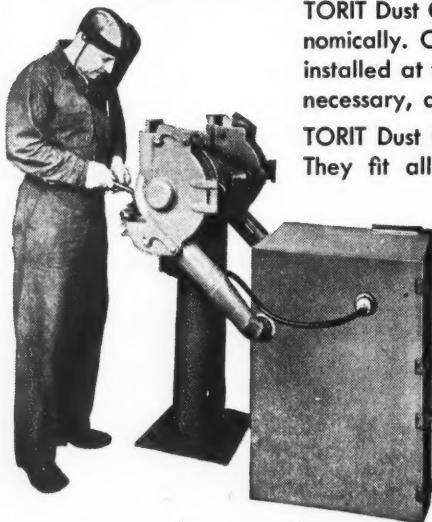
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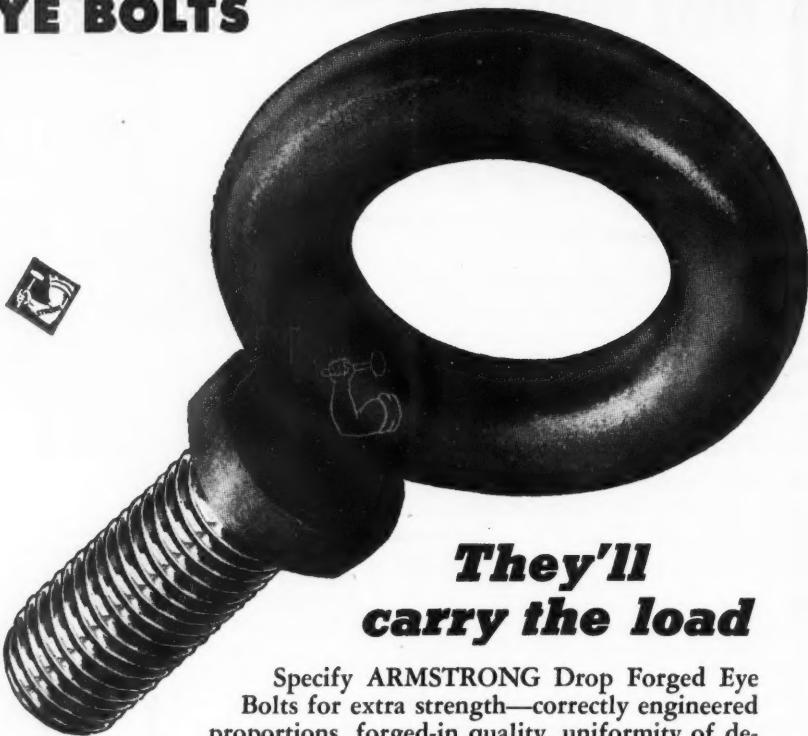
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MODERN Machine Shop

DECEMBER, 1947

VOL. 20, No. 7

CINCINNATI, OHIO

This Month

The feature article this month, by E. R. Yarham, is the first of a series of articles devoted to the spinning and panel-beating of aluminum alloys. It is always interesting to learn of manufacturing methods employed in countries other than our own and then to compare their practices with ours. Mr. Yarham provides the reader of this article with an excellent resume of British methods of fabricating aluminum alloys. His information is based upon the recommendations offered by the Aluminum Development Association of Great Britain.

In previous articles prepared for us by Noel Brindle on the subject "Tooling the Automatic Screw Machine," a number of work sheets were presented from which data can be obtained for designing cams. The present article by Mr. Brindle, appearing on page 134, explains a procedure for designing cams for the Brown & Sharpe automatic screw machine. Engineers and tool designers will find this article particularly useful.

Planning an air conditioning setup for a manufacturing plant requires consideration of all available methods and equipment. A. S. Wilson in his article "Air Conditioning Need Not Be Expensive" explains one method whereby the Dobbs Ferry Plant of the North American Philips Company has utilized natural resources to provide "conditioned air" for its plant. Page 168.

Gifford Mast discusses recent developments in the field of visual aptitude tests in his article "Your Employees' Best Tools—Their Eyes" which appears on page 174. He explains the merits of the telebinocular, an instrument designed to provide quick and accurate measurement of a worker's visual ability.

The "Modern Equipment at Work" section appears on page 184.

The "Ideas from Readers" section beginning on page 204 represents the usual assortment of "homemade" tools and devices.

Beginning on page 212 you will find "News of the Industry" and on page 380, the cartoon.

Spinning and Panel-Beating of Aluminum Alloys, I

The first of three articles by a British engineer, outlining some of the principles upon which British methods of fabrication of aluminum alloys are based.

By E. R. YARHAM

England

THE Aluminum Development Association of Great Britain is a technical and consultant organization, voluntarily sponsored and supported by the aluminum industry of Great Britain. Its chief function is to co-ordinate effort and disseminate information for the mutual benefit of supplier and user, and, among other objectives, to encourage the correct use of aluminum alloys. The following outline summarizes the recommendations of the Association with regard to spinning and panel-beating of aluminum alloys, dealing in this instance, however, with the hand methods of forming the alloys.

Forming Properties of Aluminum Alloys. Cold-working of any metal, such as by pressing, drawing, spinning, beating, stamping or stretching, increases its hardness and tensile strength but reduces its ductility. It is of value to the operator responsible for working aluminum alloys to have a general knowledge of the funda-

mental forming principles of these materials. These are here summarized as simply as possible.

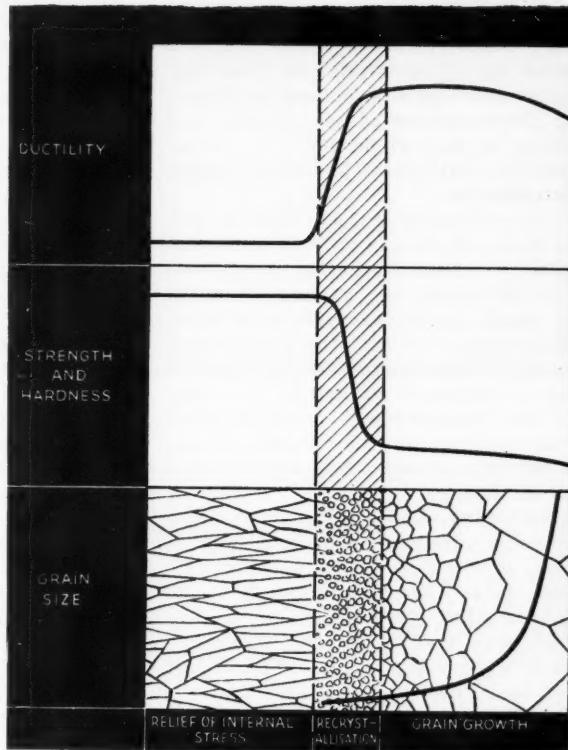
The wrought aluminum alloys are divided into two main groups—the non-heat-treatable alloys and the heat-treatable alloys. The former obtain their maximum properties by cold work alone, the latter by a combination of working and heat-treatment. As with other metals, when any of the aluminum alloys are worked cold, strain-hardening or work-hardening results. The same phenomenon—hardening—takes place when a metal or alloy is deformed plastically by cold work. During the working of the metal the tensile and yield strengths are increased while the ductility, as shown by the amount of decrease of elongation in a test piece, is reduced, and these three properties together comprise a valuable indication of the formability of a material.

Work-hardening. What happens to a metal when cold working takes place

Fig. 1.—Effect of Annealing on Grain Size, Strength, Hardness and Ductility.

may be shown by a simple illustration. When a piece of soft aluminum wire or sheet is bent back wards and forwards in the fingers, at first it will bend quite easily; in other words, it possesses a low strength combined with a high degree of plasticity. But as the bending is continued, it becomes increasingly difficult to bend the wire, due to the fact that the metal becomes stronger. In the end, if bending continues, the wire snaps suddenly, even though the strength is now relatively high. The cold work in other words, causes the metal to lose its plasticity while the strength is increased.

Compare this behavior, for instance, with that of a piece of the moulding material known as Plasticine. No matter how much the Plasticine is twisted in the fingers its plasticity remains constant, as does its strength. The fundamental question, therefore, may be stated as: Why does a metal or alloy increase in strength and decrease in malleability under cold working while the properties of such a material as Plasticine remain constant? The reason, very briefly, is that metals and alloys are crystalline structures whereas Plasticine is not. That is to say that, in the case of a metal or alloy, separate particles of the metals



(atoms) are arranged in a regular geometrical pattern which varies according to the metal. The atoms are thus built up into a large number of crystals (or grains) which are visible under the microscope.

When slight external tension stresses or pressure are applied to this crystal structure the regular arrangement of atoms in the crystal is deformed because the atoms are slightly displaced from their normal, stable positions. This disarrangement is called **elastic deformation** because when the stress is removed, the atoms return to their normal positions and the individual crystals—and, of course, the whole piece of metal—return to their original shapes. But if the stress is increas-

ed sufficiently, the atoms are forced so far out of their normal positions that they cannot return to those positions when the stress is released. This condition produces a permanent alteration in the structure of the crystal, and hence in the whole piece of metal, which is said to have undergone **plastic deformation**.

As in the case of the aluminum wire or sheet which was twisted in the fingers, an aluminum-alloy component can withstand only a certain amount of plastic deformation or cold work. Beyond that amount the loss in plasticity, or formability, is such that it can no longer be worked and cracking of the material will occur. Further cold working may be carried out only after the component has been softened by annealing.

Softening. Annealing may be defined as the process of heating a metal or alloy to some predetermined temperature below its melting-point, maintaining that temperature for a time and then cooling slowly. Annealing thus reverses the process of hardening set up by cold working and results in the alloy returning to its original soft condition. Obviously the working of metals would be very greatly restricted or even impracticable if annealing were not possible.

Softening is brought about by annealing, which involved recrystallization. Cold worked metals are hard and may be in a stressed condition, but upon raising the temperature the atoms are given sufficient mobility to resume their normal, or unstrained, positions. When metals are annealed, the atoms recover their normal arrangement and thus the internal stresses are relieved. When the temperature is progressively raised, a point is eventually reached at which the work-hardened alloy begins to soften. The softening is accompanied by an increase in plasticity. Distorted, elongated grains produced by previous

cold-working are gradually replaced by new, tiny grains which are not distorted.

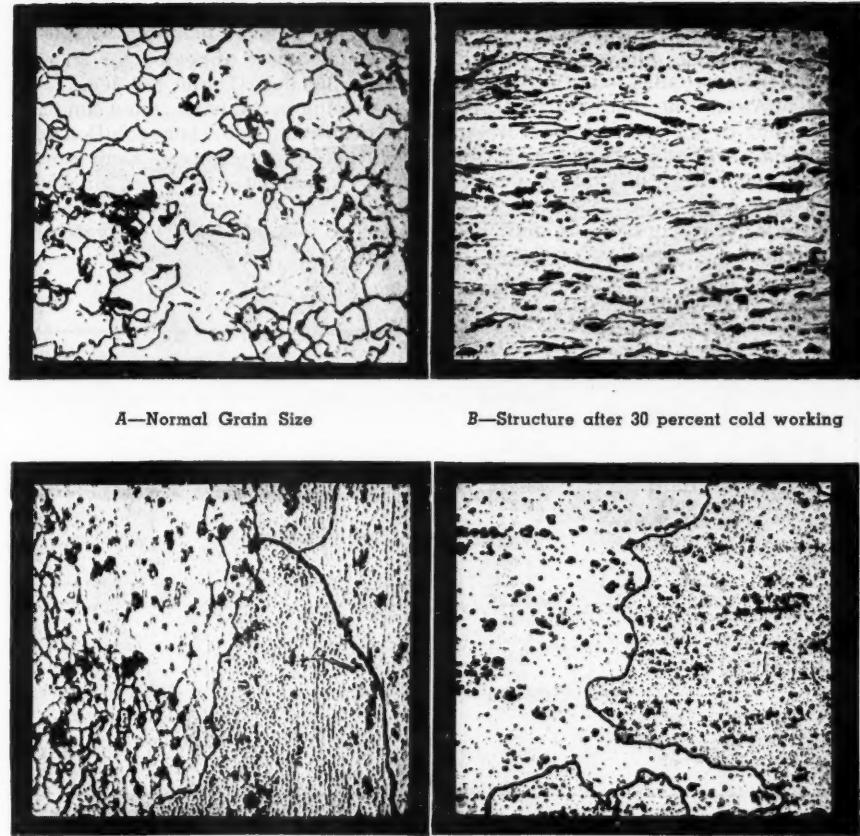
The effect of annealing on grain size, strength, hardness and ductility is shown diagrammatically in Fig. 1. The recrystallization temperature is the lowest temperature at which new crystals or grains become visible under the microscope. In fact, it is considerably lower than that used for annealing in commercial practice, since at the actual recrystallization temperature the formation of new crystals is an extremely slow process.

The new crystals grow by absorbing neighboring crystals. The size to which they grow has an important influence on the properties of the annealed material. Although the factors governing grain growth are not fully understood, it is necessary to know something of them.

Grain Growth. Excessive grain growth, as shown in Fig. 2D, reduces the mechanical properties of the metal and may produce an undesirable "orange-peel" effect on the surface when the material is subsequently worked. The following factors promote growth of excessively large crystals:

- (1) Adjacent grains of widely varying dimensions;
- (2) Local variations in the amount of cold work;
- (3) Temperature gradients in the metal during annealing;
- (4) Application of small amounts of cold work before annealing;
- (5) Unduly high annealing temperatures.

From the foregoing, some idea may be obtained regarding the most satisfactory conditions for the annealing of the wrought aluminum alloys. The metal should be brought rapidly to the specified annealing temperature and removed from the furnace as soon as this is attained. When forming or other type of cold work is done between



C—Structure upon recrystallization after annealing

D—Structure in which grain growth has occurred

Fig. 2—Effect of Cold Work and Annealing on Aluminum Alloy Sheet to B.S. 5L3.
(Magnification X200)

anneals the metal should be given the maximum amount of cold work to which it may be subjected without cracking, since small amounts of cold work may lead to excessive grain growth in subsequent annealing operations. Long soaking at high annealing temperatures may also lead to this result. The recommended annealing temperature for the non-heat-treatable al-

loys ranges from 320 deg. C. to 420 deg. C. depending upon the composition of the alloy chosen and its condition.

Local annealing should be avoided whenever possible, as it often leads to the formation of areas of excessive grain size and, since it is frequently done with a blowpipe, may result in local over-heating of the material.

Figure 2 shows the effects of cold

working and annealing on aluminum-alloy sheet to B.S. L₃.

Heat-Treatable Alloys. The foregoing in general applies to both the heat-treatable and the non-heat-treatable alloys, but in the case of the former, additional factors have to be taken into account when annealing is considered, since the hardness may be due to heat-treatment, cold-working, or both. Al-

applied to heat-treatable alloy sheet to B.S. L₃.

Samples were annealed for 30 minutes at 360 deg. C., and 430 deg. C., the sheet being in the hard-rolled condition and not having undergone solution heat-treatment. Samples from each annealing were quenched in water, allowed to cool in air, or slowly cooled for two hours to 200 deg. C. They were then

Table I—Annealing of Wrought Aluminum Alloy Sheet to B.S. 5L3

Material	Condition	Vickers Diamond Hardness	26	20	16	12	10
			0.018 in.	0.035 in.	0.064 in.	0.104 in.	0.128 in.
B.S. L ₁₇	Soft	20-22	0	0	0	0	0
B.S. L ₁₆	Half-hard	29-35	½	½	½	½	½
B.S. L ₄	Hard	38-41	1	1	1	1	1
D.T.D. 213 A	Soft	27-32	0	0	0	0	0
	Half-hard	35-48	1	1	1	1	1
	Hard	50-65	1	1	1	1	1
B.S. L ₄₆	Soft	43-65	0	0	0	0	0
	Half-hard	73-96	½	½-1	½-1	1-2	1-2
	Hard	102-124	2	2	2-3	3-4	—
D.T.D. 346	Soft	43-65	0	0	0	0	0
D.T.D. 132 A	Soft	78-90	½	½	1	1	2
B.S. L ₃	Annealed	40	1	1	1	1	1½
	As quenched	80	1	1	2	2	2
	Aged	120-130	3	3	3	3	4
D.T.D. 390	Annealed (Clad)	—	1	1	1	1	1½
	As quenched	—	1	1	2	2	2
	Aged	—	3	3	3	3	4

loys which have been work-hardened, either after solution heat-treatment or annealing, require a procedure similar to that for non-heat-treatable alloys, but special precautions are necessary to avoid difficulties resulting from age-hardening.

Softening of heat-treated alloys which have been work-hardened after annealing may be carried out by heating to 340 deg. C. plus or minus 10 degrees. The soaking time allowed is usually one hour. Incorrect annealing techniques will produce a variety of strengths and hardnesses in the heat-treatable alloys.

Table I shows the results of tests

tested, immediately after annealing, and tested again 10 days later. From the results obtained the following facts were apparent:

- (1) Annealing at the lower temperature provides increased softness;
- (2) There is less ageing after annealing at the lower temperature;
- (3) If the annealing is carried out at the correct temperature, quenching after annealing, as compared with ordinary air cooling, does not result in greatly increased hardness;
- (4) Retarded cooling after annealing results in greater initial softness; in addition, the material is

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stable and remains soft for an indefinite period.

For all normal purposes, therefore, it is satisfactory if the heat-treated alloys are annealed at the lowest practicable temperature, which may lie between 330 deg. C. and 380 deg. C. Where extreme softness and stability are required, slow cooling of the material is recommended.

In the case of material which has previously been solution-heat-treated

quired by the specification being obtained, in the case of the naturally-ageing alloys, within four or five days. Other heat-treatable alloys do not attain their maximum strength until they are subjected to low-temperature precipitation treatment.

In both instances hardening begins as soon as the metal is quenched, so that working operations must be carried out before this hardening has proceeded too far for the required amount

Table II—Radii Required for 90 deg. Bend in Terms of Thickness

Temperature and Condition of Annealing	Maximum Stress (tons per square inch)	
	30 minutes after Annealing	10 days after Annealing
360° Quenched in water	13.4	16.6
360° Cooled in air	13.7	15.7
360° Slowly cooled	13.2	13.5
430° Quenched in water	15.9	20.1
430° Cooled in air	15.7	19.2
430° Slowly cooled	13.8	14.0

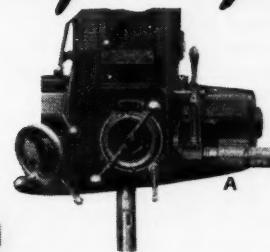
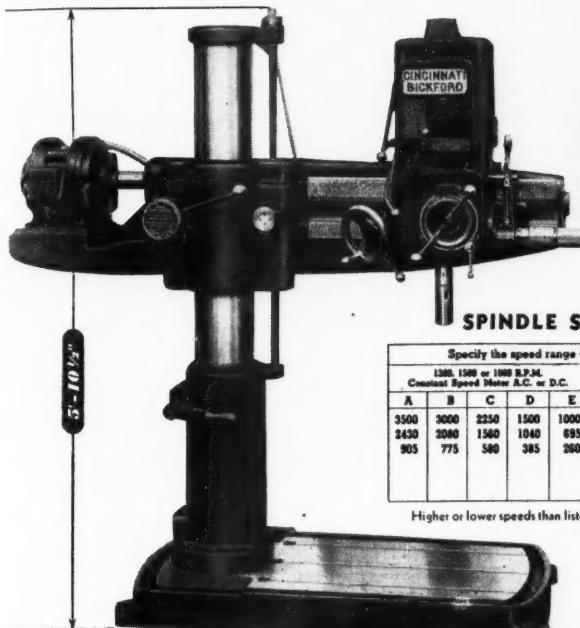
and aged, it is advisable to raise the annealing temperature from 400 deg. C. to 420 deg. C. and cool slowly, since to obtain maximum softening it is necessary to produce the maximum quantity of the finely dispersed hardening constituents.

Working of Solution Heat-Treated Material. An alternative procedure to annealing is often employed for heat-treatable alloys; namely, working or forming the material in the soft condition obtainable by solution treatment. Solution heat-treatment, it will be remembered, consists of heating the alloy for a specific period of time at a carefully controlled temperature of around 500 deg. C. and then cooling it rapidly from this temperature, usually by quenching in water. The freshly-quenched metal is soft but begins to harden immediately, the properties re-

of deformation. In practice, this entails working the naturally-ageing alloys within two hours of quenching unless the metal is stored at a low temperature immediately after quenching. It should be noted that solution heat-treated sheet and strip can be sufficiently soft for pressing and other working operations for periods up to four days by storage at temperatures of from -15 deg. C. to -20 deg. C. As soon as the material is removed from the refrigerated storage, ageing commences and working should be carried out within two hours.

Material which has been solution heat-treated always suffers from distortion, which may be removed either as part of the subsequent forming operation or by passing the metal through a roller leveling machine or by stretching. If leveling before form-

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A	B	C	D	E	F	G	H	I	K	A	B	C	D	E	F
3500	3000	2250	1500	1000	3500	3000	2250	1500	1000	2430	2080	1560	1040	685	
2430	2080	1560	1040	685	1750	1500	1125	750	500						
905	775	580	385	280	1215	1040	780	520	345						
					905	775	580	385	280						
					450	385	280	190	130						

Higher or lower speeds than listed above are available on special order.

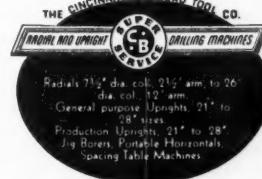


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ing is resorted to, it should be remembered that the metal is subjected to some working by the leveling process itself and consequently is hardened to some extent, therefore it will withstand less further work than will fully annealed sheet. If the amount of work required is large, this small amount of work-hardening due to leveling may introduce difficulties in the subsequent working operation when the limit is approached.

The degree of cold forming which may be carried out in different alloys in various conditions can be ascertained from the figures given in Table II. In this table the minimum radii of bend for a 90 deg. flange are given in terms of thickness of the sheet or strip.

The second and third sections of this article will appear in the January and February issues of MODERN MACHINE SHOP.

"Limits and Fits for Engineering and Manufacturing" (B4.1-1947). A new American Standard to be used by those dealing with one of the major problems in the mechanical and related mass production industries has been developed by the technical committee of the American Standards Association. The standard, entitled "Limits and Fits for Engineering and Manufacturing" (B4.1-1947), is a partial revision of the tentative American Standard on Tolerances, Allowances and Gages for Metal Fits approved in 1925. Its purpose is to serve as a guide to the machine designer in keeping to a minimum the various tools and gages required to produce and inspect cylindrical holes and shafts or other component parts with cylindrical external surfaces.

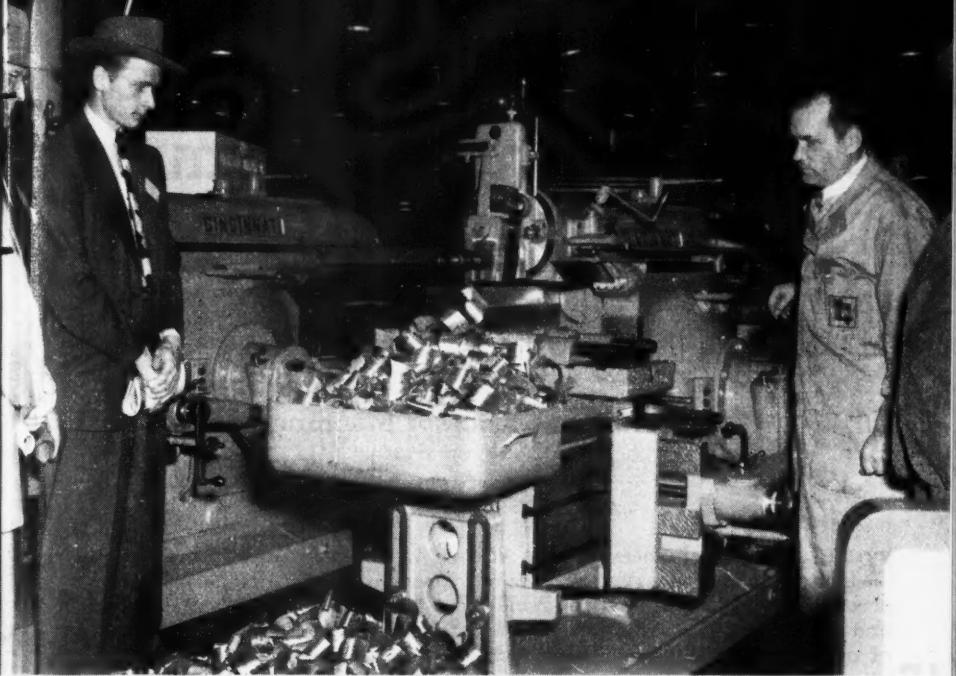
A series of definitions of terms applicable to a system of limits and fits is given in the standard. These definitions have been agreed upon by representatives of the American, British, and Canadian national standards bodies. The standard is intended primarily for application to fits between cylindrical parts but may also be used for fits between parts of a different kind, such as a shafting key and the keyway in which it is to be inserted. Copies of the standard are available at a price of 30 cents each from the American Standards Assoc., 70 E. 45th St., New York 17, New York.

"The Management Leader's Manual." The first of a series of handbooks on the improvement of individual and group relationships in the nation's business structure, jointly written by business, scholastic and government authorities on personnel management and industrial relations, has been published by the American Management Association, 330 W. 42nd St., New York 18, N. Y., under the title "The Management Leader's Manual."

Designed primarily for operating executives, supervisors, and foremen, whose management role it emphasizes, "The Management Leader's Manual" was compiled to promote wider understanding of managerial problems and techniques, particularly in the field of human relations. Edited by James O. Rice and M. J. Dooher, of the AMA staff, its seven sections include contributions of a score of management authorities. The seven sections deal with the management leader's human relations responsibilities, management leadership in a democracy, interviewing and counseling techniques, and means of diagnosing organization problems. Also included is a section of tests to determine the qualifications for management leadership.

Among the authors are Rexford Hersey, Director, Executive Development and Training, American Airlines, Inc., New York; Leland P. Bradford, Director, Adult Education Service, National Education Association of the United States, Washington, D. C.; Ellis C. Maxcy, Personnel Relations Supervisor, Southern New England Telephone Co., New Haven; Dr. Ronald Lippett, Institute of Group Dynamics, Massachusetts Institute of Technology, Cambridge; John M. Pfiffner, Professor of Public Administration, University of Southern California, Los Angeles; and E. G. Michaels, Vick Chemical Co., Greensboro, N. C.

The volume is designed for individual reading to further knowledge of the management structure, for supervisory conference training through chapter-by-chapter discussion, as a desk manual for executives and supervisors, and for general reading as an introduction to practical, professional management. Spiral bound in blue leatherette, the manual is available at a price of \$3.00 per copy. Quantity discounts are available to organizations desiring to use the manual for training purposes, to schools and colleges, professional and educational groups. Additional information can be obtained by writing to the American Management Association, 330 W. 42nd St., New York 18, New York.



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Tooling the Automatic Screw Machine, XX

In this article the author explains a procedure to follow in designing cams for the Brown & Sharpe Automatic Screw Machine

By NOEL BRINDLE

THE planning engineer who is required to choose a type or style of screw machine, determine spindle and surface speeds, arrange the order of operations in a manner which will allow a workpiece to be made most economically and specify the most suitable tools, undoubtedly has found the information contained in the preceding articles of this series of considerable value when estimating the number of seconds required to make a workpiece. However, for the guidance of the engineers and tool designers who may also be interested in designing the cams from the information contained in the various work sheets which appeared in the preceding articles, the following article has been prepared.

Among the more important items to be considered when designing the cams for the turret and cross slides of the Brown and Sharpe automatic screw machine are the following:

1. Establish the position of the turret slide and check for any possible cutdown on the lead cam lobes.
2. Change all revolutions into hundredths of cam surface.
3. Draw the cam blanks.

4. Draw the lobes for each cutting operation.
5. Connect each lobe with drops and rises, using the cam template.
6. If a threading operation is to be performed, determine the number of revolutions required and figure the throw required.
7. Draw the thread lobe.
8. For a slow job, use a graphic method for finding hundredths to index turret.
9. For swing tool work, use the lever templates.
10. Use a graphic method to find the clearance required between turret and cross slide tools, particularly when specially designed tools are to be used. Clearances shown on page 253 of the B & S Handbook are for standard tools only.

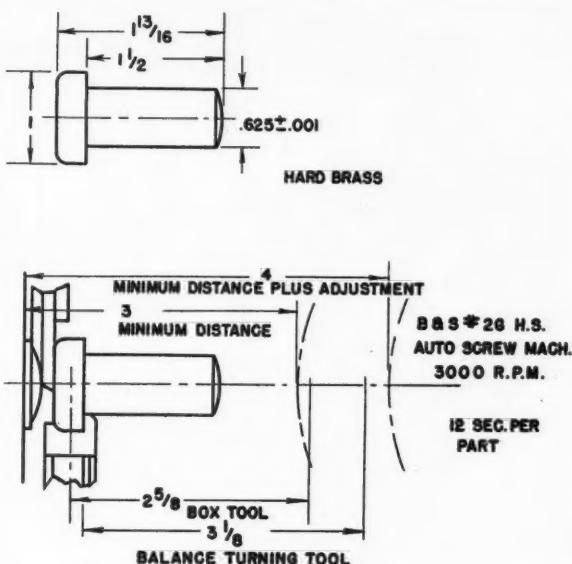
A data sheet is presented in Fig. 1, showing a brass piece which will require rough and finish turning operations. Assuming that the time per part has been previously determined, it is then necessary to consider two factors before proceeding to design the cams. First; establish the position of the turret slide and determine whether any cutdown on the lead cam will be

Fig. 1 — Data Sheet
Showing Layout of
Operations for a Brass
Workpiece Which Will
Require Rough and
Finish Turning
Operations

n e c e s s a r y
and second;
change the revolu-
tions for all the
items shown in
the order of oper-
ations into hun-
dredths of cam
surface.

**Establish Position
of Turret
Slide and Check
for Any Possible
Cutdown on Lead
Cam Lobes.**—The
minimum distance
from the front of the
turret to the face of the
chuck is three
inches on the No.
2 high speed ma-
chine (with 36
spindle speeds) as
indicated by data
presented on page
258 of the Brown
& Sharpe Hand-
book. The turret is

located in this position when the lead
lever roll is on the circumference of a
9 inch lead cam. A screw adjustment
on the turret slide permits setting the
turret backwards a distance of 1 inch,
if required; therefore, the minimum
distance from the turret to the face
of the chuck will be between 3 inches
and 4 inches, depending upon the pos-
ition of the turret slide. If enough space
is not obtained by this means to ac-
commodate the length of tools to be



Order of Operations	Throws	Feeds	Revs.	Hdths.
Feed to Stop			30	5
Index Turret			30	5
Rough Turn	1.500	.010	150	25
Index Turret			30	5
Finish Turn	1.500	.010	150	25
Clear				7
Form Dw.	.192	.003	68	11
Cut Off (From 1/2 Dia.)			102	17
			600	100
Operation Partially Overlapped				
Cut Off Dw.	.569	.003	188	31

used, the cam may be cut down to a
smaller diameter on some or all of the
lobes.

To determine the distance required
for the location of the turret slide and
the possible cutdowns for the lead
cam lobes, it is necessary to find the
length of the body and shank on the
No. 22 Balance Turning Tool and the
No. 22 B Box Tool which will be used
for the example shown in Fig. 1. This
information may be found by referring

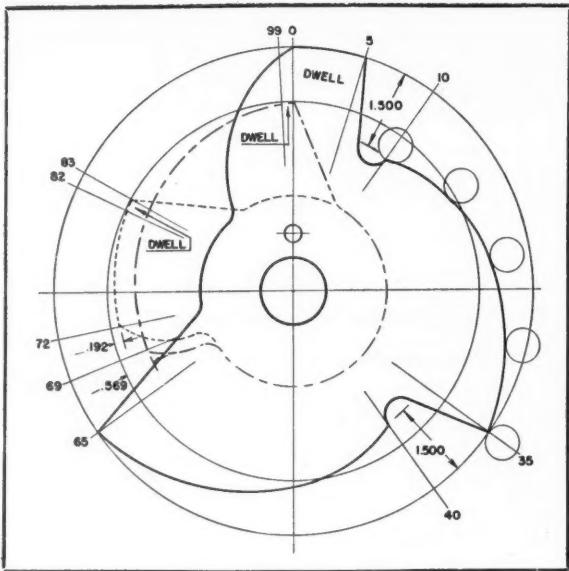


Fig. 2—Illustration Showing Method of Drawing Cam from Information Presented in Data Sheet Fig. 1

to page 264 of the B & S Handbook, which shows the dimensions of standard turret tools.

A method is presented in Fig. 1 which may be used for determining whether any cutdowns are required for the workpiece under consideration. The body of the balance turning tool is $3\frac{1}{8}$ inch. This distance is measured on the chuck sketch, starting from the point where the tool finishes its cut at the shoulder of the piece and extending backwards toward the turret position. The same procedure is followed with the box tool. The two points now established are beyond the position of the turret when it is located at its minimum distance from the chuck. It will be noted that full adjustment of the turret will be required to provide sufficient space for the turret tools.

At all times it is desirable for the full shank of each tool to be held in the turret. However, when the shank of one tool extends through the hole into the center of the turret, the shanks of

tools adjacent to it cannot enter into the turret for a distance of more than $1\frac{1}{8}$, $1\frac{1}{4}$, and $1\frac{1}{2}$ in., for the 00, 0, and 2 size machines respectively. Otherwise, the shanks will interfere.

Change the Revolutions Into Hundredths.

To make it possible to proceed with the drawing of the cams, it is necessary to change the items shown in the "revolutions" column in Fig. 1 into hundredths of cam surface. This is accomplished by multiplying each number of revolutions by 100 and dividing by the total revolutions shown at the bottom of the column. If it is found that more than 100 hundredths are included in the column, it will be necessary to subtract the necessary number from one or more cutting operations having the largest revolutions. However, when the column totals less than 100 hundredths, the extra hundredths are added to the cutting revolution for the operation which can use to advantage a reduced cutting feed per revolution.

Drawing the Cams.—The method of drawing cams is essentially the same for all size machines, therefore the description for the example in Fig. 1 will be continued.

A 9 inch diameter circle and two 7 inch diameter circles are drawn on the cam design sheet as shown in Fig. 2. The center holes and pin holes should also be added. All information pertain-



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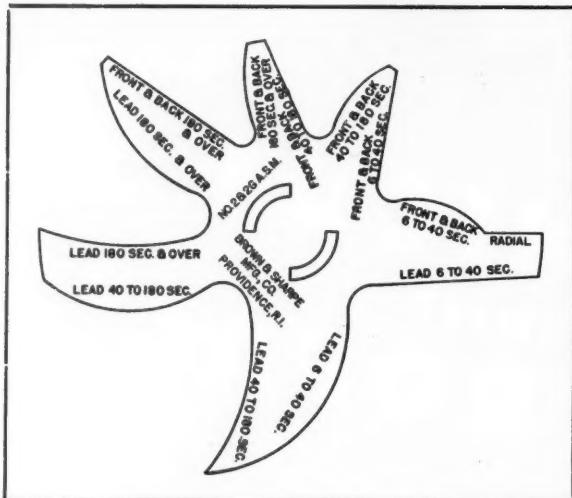
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Fig. 3—Drawing Illustrating
a Brown & Sharpe No. 2 and
2G A.S.M. Standard Cam
Template



ing to the cams may be obtained from page 254 in the Brown & Sharpe Handbook. A template, divided into 100 divisions, should be placed in the center of the 9 inch circle and, from the information provided in Fig. 1, the location of each hundredth is indicated with a pencil as shown in the hundredth column. Radial lines should then be drawn through each of these points extending approximately $\frac{1}{2}$ inch beyond the circles and extending downwards to within approximately 1 inch of the center hole.

For the first 5 hundredths, as shown in Fig. 1, the stock stop is in position, therefore a dwell will be provided on the top of the 9 inch cam.

From 5/100 to 10/100 the turret is indexed and withdrawn for a distance which will be sufficient to position the lead cam roll at the beginning of the first turning operation. On the 10/100 radial line $1\frac{1}{2}$ inches is measured from the outside diameter of the cam. This represents the start of the balance turning tool lobe.

How to Develop a Cam Lobe Curve.
—From 10/100 to 35/100 the balance

turning tool is in operation. To develop a uniform curve with a constant rise, the throw is divided into any number of equal parts and the arc of cam circumference occupied by the rough turning operation is also divided into the same number. Arcs are swung at points of division on the throw

and radial lines are drawn to intersect these arcs from each point of division on the cam circumference. A french curve is used to draw a spiral line through the points of intersection which will be the outline of the lobe. A simpler method for drawing the cam lobe curve, which is usually satisfactory except on a large cam rise, is to use a set of compasses.

The steel point of a compass may be placed at the end of the rise and an arc drawn through the center of the cam. The steel point is then located at the beginning of the rise and the arc intersected. The steel point is placed at this intersection and the rise or curve can then be drawn. It will be found that when a large number of hundredths of cam surface are required for a lobe, it may be necessary to divide the cam throw into two or more parts and use the compasses as many times as required in order to complete the cam curve.

The lobe for the finish turning operation should now be drawn, using the same method as outlined above. The lobe for the positioning of the turret



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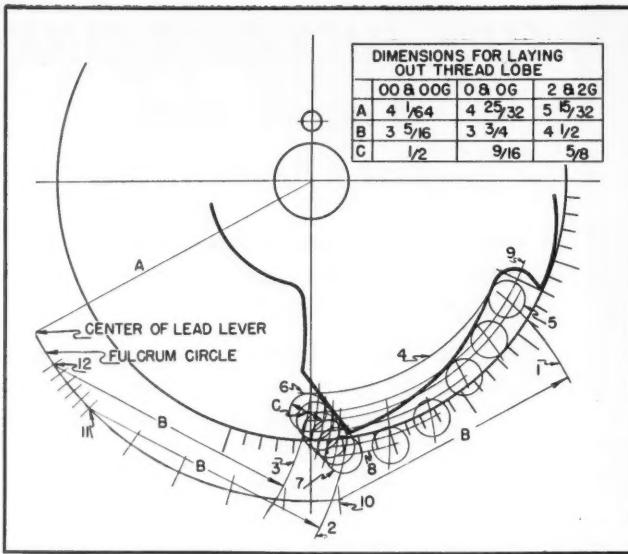


Fig. 4—Drawing Illustrating the Development of the Lobe Which Is Required for the Threading Operation

180 seconds and over. For the example in Fig. 1 the drops and rises for 6 to 40 seconds will be used.

It will be noted in Fig. 1 that 7/100 of cam surface is allowed to provide clearance between the finish turning operation and the forming

operation. Therefore, at 72/100, the forming lobe will commence and it will end at 83/100 with one hundredth provided for a dwell on the top of the cam to allow the form tool to "clean up the cut."

To obtain a gradual rise of .192 inches, a set of compasses will be used as mentioned previously. The back cross slide cam, used for cutting off the part, starts its lobe at 69 hundredths and ends at 0, with a rise of .569 inch. The rise will be drawn in the same manner as outlined for the front

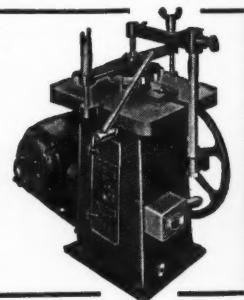
stop, while feeding the bar rod, should also be added, followed by the drops and rises which connect the lobes. For this purpose, a standard cam template, as shown in Fig. 3 should be used. For each size machine, two types of templates are available. One is used for very fast jobs only, while the other one is used for the majority of parts. On each template there are drops and rises for several ranges of seconds. On the regular template for the No. 2 machine, there are drops and rises for 6 to 40 seconds, 40 to 180 seconds and

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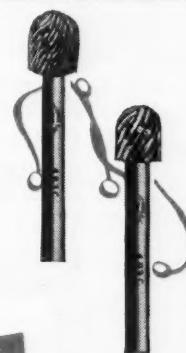
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cross slide cam. The cam drawing will then be completed.

A Procedure to Follow When a Threading Operation Is Required. Number of Spindle Revolutions When Threading.—Let it be assumed that a workpiece requires a thread which is $\frac{1}{4}$ inch long, with a pitch of 20 threads per inch. This necessitates that the spindle will rotate for 15 revolutions while the die advances on the work. After the spindle is reversed, the same number of revolutions will be required to allow the die to withdraw. This procedure is followed when a button or an acorn type die is used.

It is advisable to add several revolutions to the actual number required, to provide for the approach to the workpiece before threading and to clear the end of the threads after threading. For a medium pitch thread it is customary to add 3 revolutions. This figure should be increased or decreased when a fine or coarse pitch thread is to be machined. For a 20 pitch thread, 3 revolutions will be sufficient.

The time of the job in seconds is based on the number of spindle revolutions required to complete a workpiece if the spindle could be run continuously at fast speed. Therefore, when the spindle revolves at slow speed while threading, an element of time must be provided which will equal the revolutions that would be obtained if the spindle had continued to run at the fast speed. The equivalent revolutions are found by direct proportion. Assuming that the spindle speed for turning, forming and cutting off the workpiece is 3000 r.p.m. and the threading speed is 1000, the threading revolutions required, based on the fast speed, will be found by multiplying the 18 revolutions at the threading speed by the high speed and dividing by the low speed.

After the threading revolutions have been changed into hundredths of cam



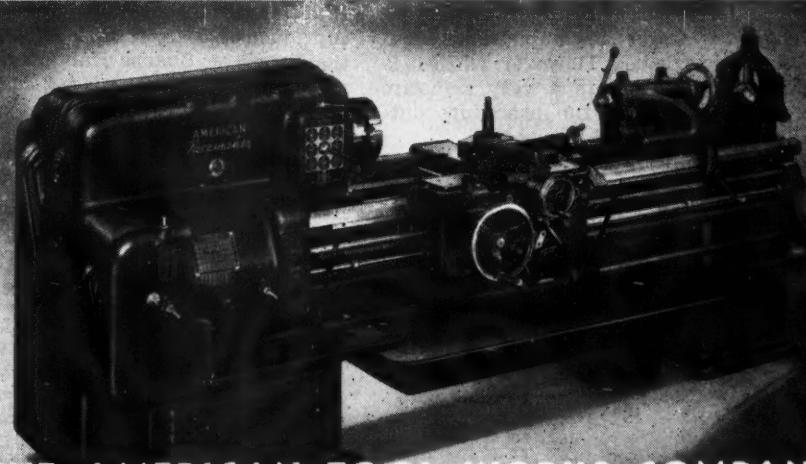
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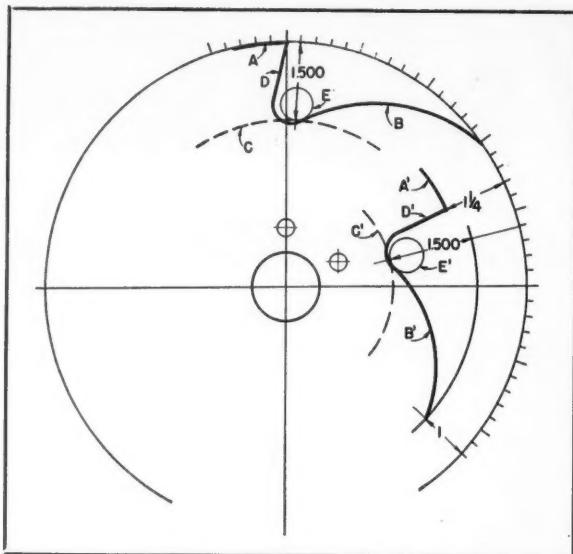


Fig. 5—Diagram Illustrating the Graphic Layout of the Distance the Cam Lever will Travel at Each Indexing

the lobe required for a threading operation and here it will be noted that the true path of the cam lever roll is considered, which is an arc, rather than a radial line.

The fulcrum or center of the lead lever, on which the lead cam roll is mounted, is a distance A from the center of the cam, as shown in Fig. 4. The length from

the center of the lead lever to the center of the roll is equal to B. The path followed by the center of the roll is always an arc swung from any point in the circumference of the fulcrum circle with B as a radius.

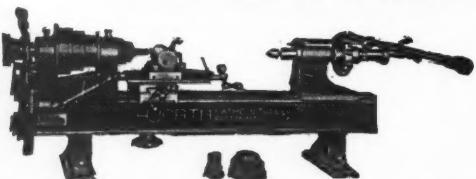
Drawing Fulcrum Circle and Determining Start and Finish of Lobe.—A radius of $5 \frac{15}{32}$ inches, shown in the Brown & Sharpe Handbook table for distance A on the No. 2 machine, will be used in this instance. Assuming that the thread lobe starts at 34 hundredths, the compasses will be set

surface, the hundredths are changed again to revolutions based on the threading speed. These revolutions are divided by the pitch of the thread. The answer equals the actual throw for the threading operation.

Drawing a Thread Lobe.—Usually a lobe for a threading operation is designed by using the compasses as mentioned previously. However, when it is necessary to obtain a very accurate rise on the lobe, the procedure outlined below should be used.

Fig. 4 illustrates the development of

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at $4\frac{1}{2}$ inch radius, which is the corresponding dimension for radius B on the diagram. Using the 34 hundredths intersection of the cam circumference as a center, the fulcrum circle will be intersected. Reversing the compasses and using as a center the point of intersection just established on the fulcrum circle, an arc, 1, will be swung through the 34 hundredth division towards the center of the cam.

It may be assumed that the lobe will require 14 hundredths of cam surface while the die runs on the work. Therefore, at the 48 hundredth intersection of the cam circle, another arc, 2, will be swung, as described above and a third arc, 3, swung through the 51 hundredth division, which represents the end of the die lobe. Arcs have now been established for the start, full height and finish of the lobe.

Assuming that the throw is $\frac{1}{8}$ inch, a radial distance of $\frac{1}{8}$ inch is measured from the cam circle towards the

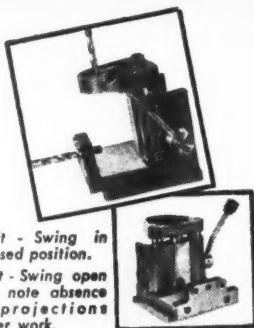
center and a point is established which represents the full depth or throw of the lobe. The lobe will start at this depth and also end at the same depth, therefore, an arc, 4, is swung through the point, using the center of the cam drawing and intersecting arcs 1, 2, and 3.

Determine Positions of Cam Lever Roll.—The compasses are adjusted to the radius of cam lever roll C, which is $\frac{1}{16}$ inch on the No. 2 machine. On arc 1 a circle 5 is swung tangent to arc 4. This circle represents the position of the roll at the start of lobe and a circle 6 similarly established on arc 3 indicates the position of the roll at the end of the lobe. A third circle, 7, is swung with its center on arc 2 and its circumference tangent to the cam circle. This circle indicates the theoretical position of the roll when positioned at the top of the lobe.

The path to be followed by the roll will be a curve between these three

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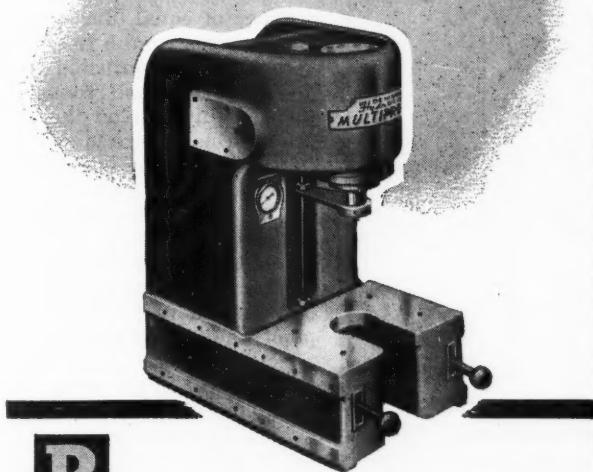
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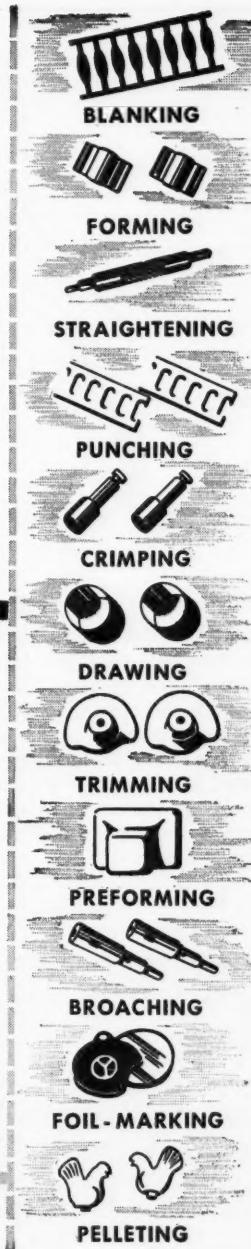
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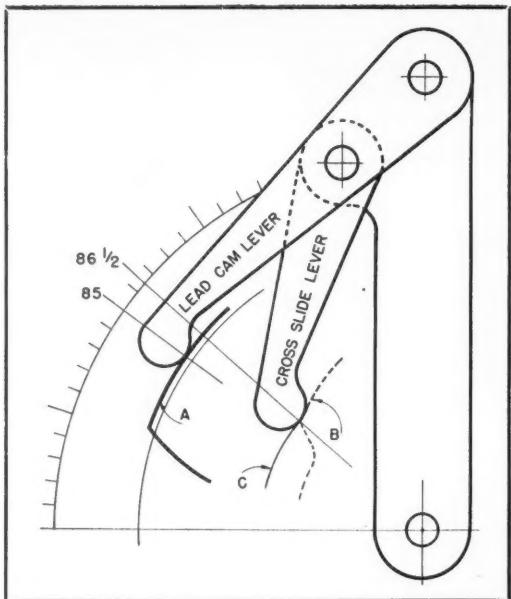


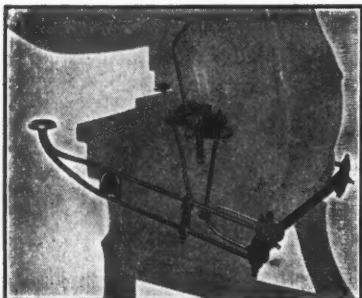
Fig. 6—Drawing of Lever Templates. These Templates Provide the Means for Determining the Positions of the Slides Directly

positions that have just been found. To find this line, the following procedure should be used. First, swing arcs 8 and 9 and then divide the intervening space into any number of equal parts. In this example, the space has been divided into five equal parts. Concentric arcs should now be swung through the points of division as shown on the diagram.

The distance from 10 to 11 on the fulcrum circle is divided into the same

number of equal divisions as the distance from 8 to 9. The compasses are adjusted to a $4\frac{1}{2}$ inch radius and from each point of division on the fulcrum circle an arc is swung, intersecting the concentric arcs included between 8 and 9. The consecutive points of intersection of these arcs represent the path of the cam roll center and by swinging the diameter of the roll at each point, the path of the circumference of the roll or the theoretical curve of the lobe is determined. The same method of development is used for the withdrawing of the die.

Theoretical Versus Practical Outline of Lobe.—Die and tap holders are made to pull out, consequently thread lobes are not made to follow the exact theoretical curve. After the first few revolutions, the actual cam curve recedes from the theoretical line so that the die or tap leads itself and is not forced on the work. When the full height of the lobe is reached, the hold-



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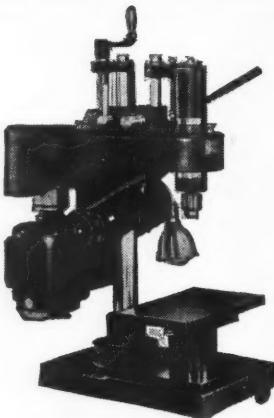
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er is allowed to pull out the balance of the distance required to complete the threading operation.

Thread Lobe for Self Opening Dies.

—There are several makes of opening die heads, each of slightly different design. The principle of operation is almost the same for all heads used in the automatic screw machine. The tool is held stationary in the turret by its shank and when the advance of the turret is stopped, the forward motion of the rear part of the holder also ceases. However, the front part of the die head advances still further due to the continued cutting action of the chasers, until the locking arrangement disengages the chasers from the work, thus permitting the tool to be withdrawn without reversing the spindle. This type of die head is also arranged with cushion springs between the shank and front part which will compensate for any error in the turret slide cam and prevent "crowding" of the die.

When designing a die lobe for a self-opening die holder, the same procedure as outlined above should be followed. However, a dwell should be provided at the top of the lobe to allow the front part of the die holder, carrying the chasers, to pull out and disengage from the body of the tool. This dwell should equal approximately 3 revolutions based on the threading speed. For a coarse pitch thread these revolutions should be reduced and for a fine pitch thread 5 or 6 revolutions may be allowed.

Graphic Method of Finding Space for Indexing Turret.—When designing cams for jobs requiring 30 seconds or over, it should be noted that the space required to index the turret can be determined by a diagram instead of taking the figures given in the "Approximate Table of Hundredths of Cam Surface," shown on page 252 of the Handbook. This method permits closer calculation of the hundredths require-

How We Beat Rising Costs by Changing to Welded Design

By Francis M. Wick, General Manager
Silver Manufacturing Company, Salem, Ohio

DESPITE the fact that costs have greatly increased in the past two years, the material costs of our "Ohio" Feed Cutter (Fig. 1) are no more today than on V-J day, due to the savings we have gained by changing to welded steel design.

The change to welded steel has also cut the machine's weight 24%, from 455 to 345 pounds—really a price decrease, since most of our sales are to foreign customers who pay duties assessed on basis of weight.

We originally started experimenting with welded steel design because of the difficulty of getting a regular flow of parts. Our welding department has not only eliminated production bottlenecks, but has enabled us to increase production 79% with only a 20% increase in employees. The chief reason for this is that the parts of welded steel require much less machining, grinding and fitting than the former material. The same man-hours we formerly put into finishing now are used to prepare raw materials for the welding department and handle all finishing.

An example of cost reductions on the individual parts is the hood (Fig. 2). The hood made by the former method cost \$1.99. We now fabricate it from three pieces of 12-gauge mild steel, flame-cut and brake-formed, for 94.3 cents, a saving of 52½%. Weight is also cut in half, from 17 to 8.5 pounds.

One of the interesting changeovers to welded design is the corrugated roll and shaft (Fig. 3). Weight was reduced from 18½ to 11 pounds. The corrugated roll is now made of twelve angles, $\frac{1}{8}'' \times 1'' \times \frac{3}{8}''$. Six of them at a time are inserted in a special jig and tack-welded together to form a half cylinder. The end discs, stamped from 12-gauge sheets, are slipped over the shaft and held in position for welding in a cradle-type jig. Then, using another special jig, the two corrugated halves are



Fig. 1. The "Ohio" Feed Cutter.

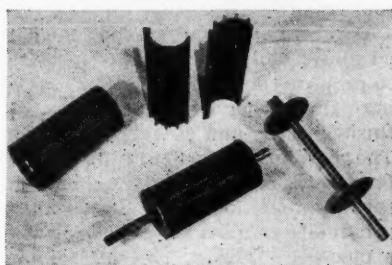


Fig. 3. At left is former corrugated roll. New welded roll and shaft (center) are fabricated from steel shapes as shown.

tack-welded to the discs. Tack welds give sufficient strength.

Welding the shaft and roll as an integral unit eliminates the man-hours formerly spent in machining and broaching keyways—a troublesome job.

In redesigning the flywheel (Fig. 4), weight was removed from the center, where it has a low moment of inertia, and concentrated on the rim, where it has the best effect. Thus the welded steel flywheel weighing 56 pounds has the same efficiency as the former design of 72 pounds.

The flywheel O.D. is 24". The rim is a $2\frac{1}{2}'' \times 1\frac{1}{8}''$ mild steel bar approximately 6' long which is heated, rolled and welded. Spokes are $\frac{3}{16}'' \times 2\frac{1}{2}''$ bars, drilled and broached at the center to match the hub of cold drawn tubing spaced between them. Welding is done in a jig which has a center post to hold the spokes and tubing in alignment, and three jaws which center the rim around the spokes. Each spoke is welded to the rim with a single pass, and two large tack welds join the hub to the spokes.

Other parts we have converted to welded design are the side plates, pulleys and smooth roll. The frame, formerly bolted, is now arc welded. All welding is done with "Fleetweld 7" electrode.

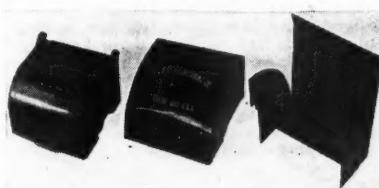


Fig. 2. Welded steel hood (center) costs 52% less than former design (left). How welded hood is made is shown at right.

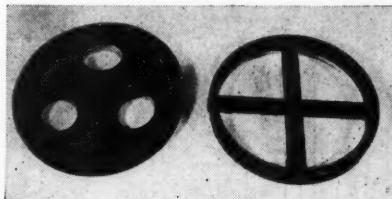


Fig. 4. The old flywheel was replaced by welded design (right) which weighs 23% less, but is just as efficient.

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ed for indexing the turret. It will enable the cam designer to reduce the time required to make the piece or to divide the extra space among the cutting operations and thereby reduce the feeds per revolution, and thus reduce tool grinding time.

Before the graphic method mentioned above can be used, it is necessary to prepare the "Cam Writeup," including the order of operations, the throws, feeds and cutting revolutions. The revolutions are totalled and referring to the table for laying out cams for the machine to be used, an approximate number of seconds to make a piece is obtained. This approximate time will be found to come within the range of one of the drops and rises on the cam template shown in Fig. 3, assuming that the No. 2 size machine has been chosen.

On the reverse side of the cam writeup sheet, an arc is swung with a radius equal to the turret cam circle.

The hundredths division for the beginning of the indexing cycle should be marked off on the arc, using a template graduated into one hundred divisions.

The arrangement of the tools in the turret should now be considered and, as mentioned previously, it should be determined whether or not it will be necessary to reduce the height of any lead cam lobes.

It is now possible to lay out graphically the distance the cam lever roll will travel at each indexing. If, for example, stop lobe A, and lobe B, as shown in Fig. 5 are both full height lobes and lobe B has a throw of $1\frac{1}{2}$ inches, an arc C should be swung. The required cam template arm, in this instance the one for 180 seconds and over, is placed in position and the line D drawn.

Circle E, representing the diameter of the lead cam roll, is then drawn tangent to arc C, allowing a small amount

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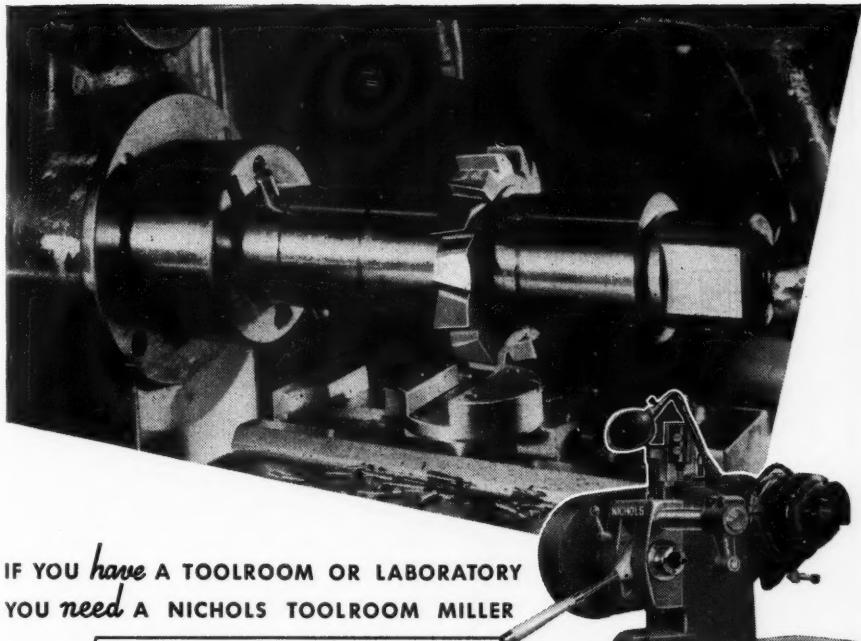
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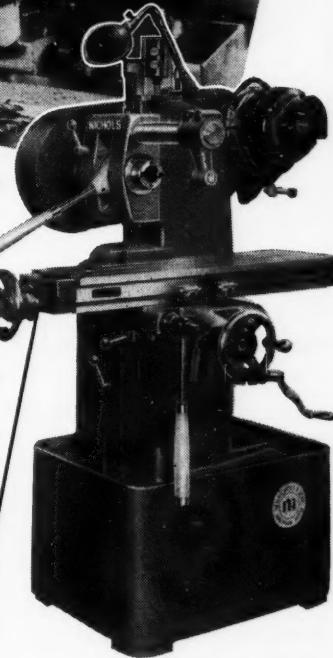
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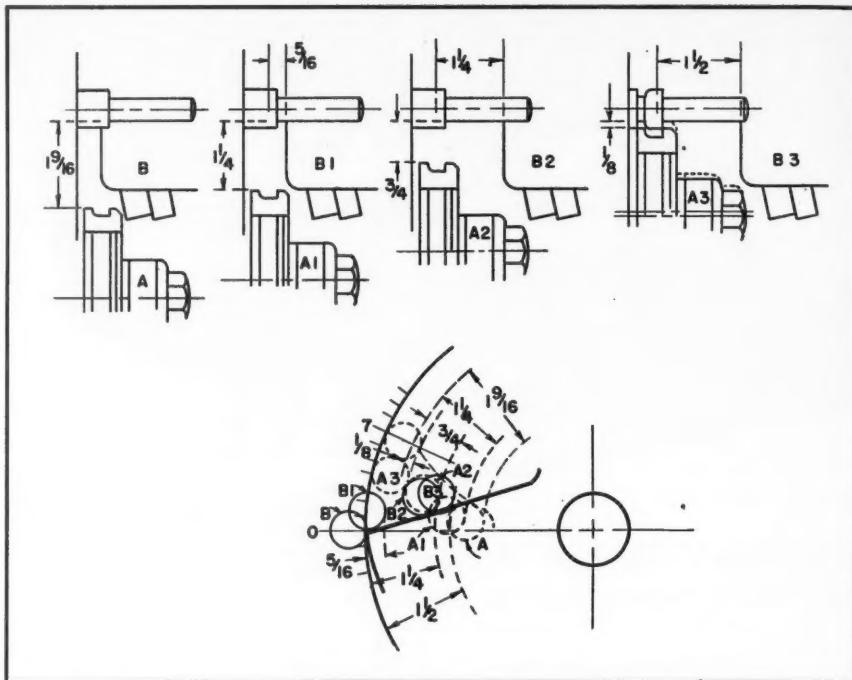


Fig. 7—Diagram Illustrating Method for Determining the Clearance Time Between the Box Tool and Front Cross Slide Tool

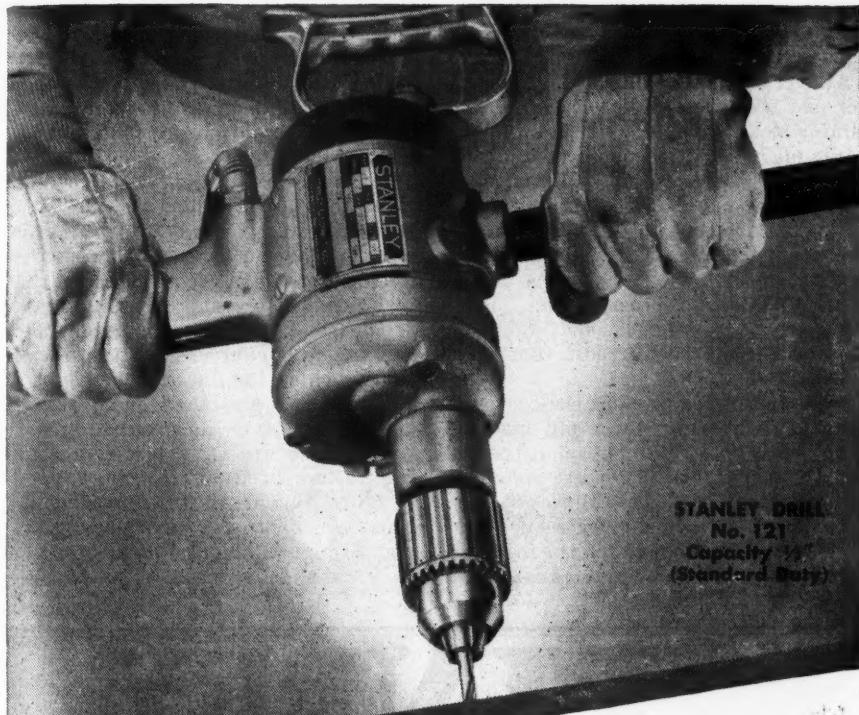
of clearance after it has ended its contact with line D. A radial line from the center of the cam through the center of E and extending to the cam circle designates the number of hundredths required for indexing the turret. In this case only one hundredth is necessary.

If either or both of the lobes are cut down from full height the throw is measured from the point of cut-down. To illustrate this, neither lobe A' or B' is at full height at the end of the rise, yet the throw of lobe B' is also $1\frac{1}{2}$ inches, the same as lobe B. This brings the lobe much nearer the center of the cam and, proceeding as outlined above, it is found that 3 hundredths are required for indexing under these

conditions.

The approximate time in seconds will sometimes lead the designer to select a certain range on the cam template. Afterwards, it may be discovered on the work sheet that the next higher range of seconds on the cam template will be required. It is difficult to give exact instructions to aid in avoiding this condition except by judgment, as one gains experience.

Using the Lever Templates.—In figuring close timing when designing cams, it is sometimes necessary to know the relative position of one or both of the cross slides when the turret slide is advancing, retreating or is located at its extreme forward position. Likewise, it is essential at other



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times to know the position of the turret slide relative to one or both cross slides.

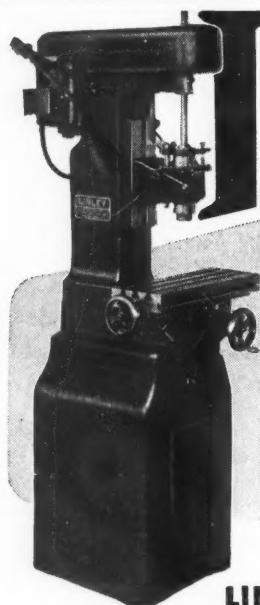
Lever templates, as shown in Fig. 6, enable the exact relative positions of the slides to be determined on the drawing without recourse to figuring. They are very useful in finding the amount of space to allow for tool clearance, or determining points that correspond on the lead cam and cross slide cams, so that the movements of the turret slide and cross slides can be synchronized when their combined action is required to feed a tool, as in swing tool work.

The templates pivot at the center of the cam drawing, by a pin inserted through a hole in the button at the end of the long arm. They are made of transparent celluloid to allow the lines of the cam drawing to be seen.

The centers from which the lead and cross slide levers swing represent the

fulcrum centers of the actual levers. The two levers are of the same length as the corresponding levers on the machine and the rounded part of their ends is of the same diameter as the rolls that bear on the periphery of the cams.

If, for example, the lead cam lever is at the 85th division on lobe A, as shown in Fig. 6, and it is necessary that the front cross slide should commence to guide or feed the tool at that instant, the corresponding hundredth on the cross slide cam is found by placing the lead cam lever with the roll just touching the line of lobe A, at the 85th division and then swinging the cross slide lever downward until it touches the arc C, which represents the bottom of the throw for lobe B. A radial line from the center of the cam drawing to the cam circle, passing through the center of the roll on the cross slide lever, shows graphically



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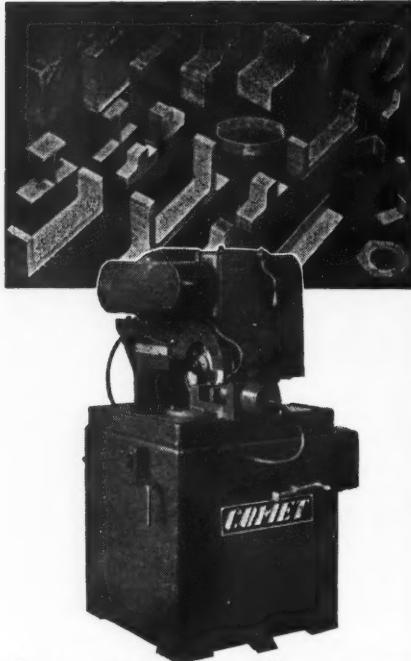
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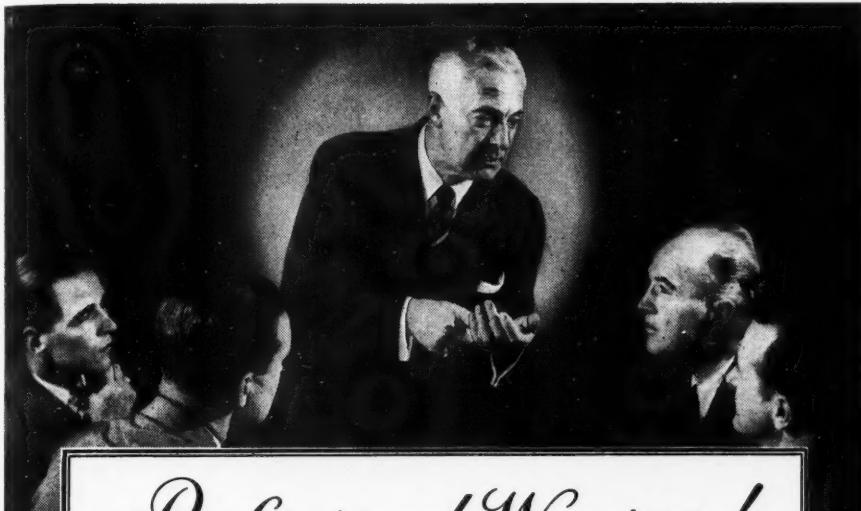
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the hundredth to start the lobe B, which is $86\frac{1}{2}$ hundredths in this instance.

Graphic Method of Finding Space to Allow On Cams for Clearance Between Turret and Cross Slide Tools.—In the example shown in Fig. 1 there is a clearance allowance of $7/100$ between the No. 22B Box Tool and the front cross slide, and $4/100$ between the box tool and rear cross slide. These figures were taken from the "Approximate Table of Clearances" on page 253 of the Brown and Sharpe Handbook. A method is now presented which illustrates how the hundredths required were determined. When special turret tools are used, this method should always be followed.

Several diagrams of the box tool and cross slide tools are drawn to scale to show the relative positions of the tools as possible points of interference. Positions corresponding to these possible points of interference are then laid out on a section of cam circle and the amount of clearance definitely found by means of the lever templates.

Fig. 7 illustrates the method by which the clearance time is found between the box tool and front cross slide tool in the example Fig. 1. At position B the box tool is at the extreme end of its travel and the cross slide at A is as far advanced as possible without coming into contact with the blade in the box tool. The next points of interference are shown in position A1 and B1 where it is necessary for the box tool to withdraw at least $\frac{1}{16}$ inch before the cross slide tool can advance beyond the point shown. A2 and B2 show the possible interference between the box tool blades and the clamp bolt on the tool post. To avoid this condition, the box tool should withdraw $1\frac{1}{4}$ inch on its return travel. A3 and B3 show the position of the box tool before the cross slide can advance fully into cutting position.



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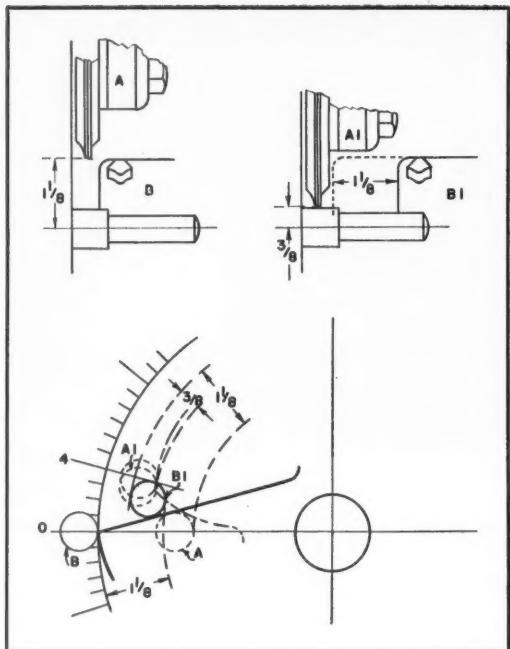


Fig. 8—Diagram Illustrating Method for Establishing the Clearance Between the Box Tool and Front Cross Slide Tool

Any of the four positions shown in Fig. 7 may be the one which governs the amount of clearance required. To determine which position will be used, the following procedure will be found satisfactory: Two arcs are drawn to represent the turret and cross slide cam circles and divided into hundredths with the "hundredths" template. Using the cam template arm for

the range of seconds within which it is estimated that the part will be made, a drop is drawn from any hundredth line.

Next, inside the cam circle, distances are drawn for the different positions such as $1\frac{1}{8}$, $1\frac{1}{4}$, $\frac{3}{4}$ and $\frac{1}{8}$ for the cross slide. At these points concentric arcs are swung. The same procedure will be followed with distances for the box tool, which will be measured from the arc representing the turret cam.

The lead lever arm of the lever templates should now be placed tangent to the cam circle where the drop commences, as this represents the position of the roll when the box tool is at its extreme inward position. The cross slide lever is swung down until its round end touches the arc drawn $1\frac{1}{8}$ inch below the full diameter of cross slide cam. The positions of both levers now represent positions A and B of the tools. With a sharp pencil, a line is

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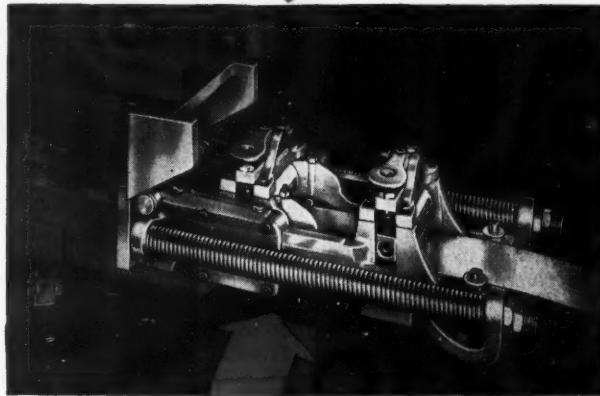
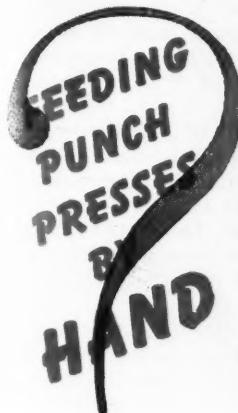
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drawn around the roll of the cross slide lever.

The lead lever is moved downward along the template line of drop until it touches the arc drawn $\frac{1}{16}$ inch inside the cam circle, representing position B1 of the box tool. This is followed by swinging the cross slide lever down to the arc that is $1\frac{1}{4}$ inch below the full size of the cross slide cam. A line is drawn around the roll and this represents the position A1 of the cross slide when the box tool is at B1.

The positions A2, A3, B2 and B3 are established in the same manner. The cam template is now placed in the center of the cam circle and rotated until the cross slide rise is tangent to the roll circle farthest advanced. It will be noted that position A1, or the possibility of interference between the cross slide tool and the body of the box tool, is the position that governs the amount of clearance required. The dia-

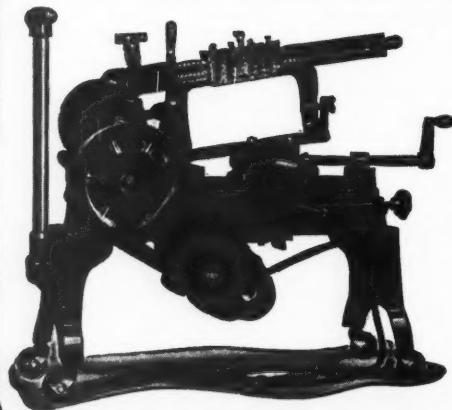
gram has demonstrated that clearance at this point will be more than ample at the other possible points of interference.

When the rise of the template is drawn to the points where the cross slide tool is in position to begin forming, it is found that 7/100 of cam surface are required.

Fig. 8 illustrates the method by which the method presented above is used in establishing clearance between the box tool and back cross slide. It will be noted that the points that govern the clearance required are the bolt on the tool post and the body of the box tool.

In preparing diagrams to establish clearances between turret and cross slide tools, it is not necessary to make drawings that show very much detail. In many instances, a set of tracing cloth drawings of a few tools commonly used may be kept on hand and

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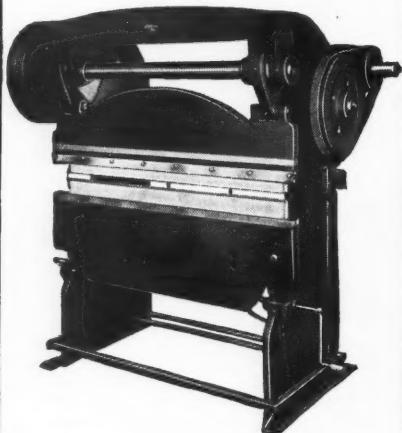
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then, instead of drawing the tools each time, the tracing cloth is placed on the drawing and moved from one position to another, measurements being taken at each point. This eliminates the time required to draw the outline of the cross slide and turret tools for each component.

Conclusion

When designing cams for the Brown and Sharpe automatic screw machine, the procedure outlined in this article should be of value to the tool engineer. For the majority of work-pieces, a set of three cams only is required to provide the necessary movements for the turret and cross slides. However, when the Vertical Slide Attachment is used, an additional cam should be furnished.

When drilling a hole in a component when the ratio of the diameter of the drill to the depth of the hole is greater than 4 to 1, it is desirable to provide one or more pullouts on the periphery of the lead cam. This allows the point of the drill to be withdrawn from the hole. The subject of drill pullouts was discussed fully in the July, 1943 issue of Modern Machine Shop.

When it is necessary to design special cams for the Screw Slotting, Burring, Index Drilling and Magazine Attachments, the information furnished in the 13th, 14th, 16th and 18th articles may be used as a guide by the screw machine engineer.

Houghton's "Cut-Max" Cutting Oils. A four-page folder on its revised line of "Cut-Wax" Cutting Oils has been published by E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 23, Pa. Entitled "4 New Series of Houghton's 'Cut-Max' Cutting Oils," the illustrated two-color folder points out the physical properties of the improved Cut-Max 100, 200, 300, and 400 series of cutting oils, as well as the reasons for the revision. Copy of Folder 2-414 free upon request.



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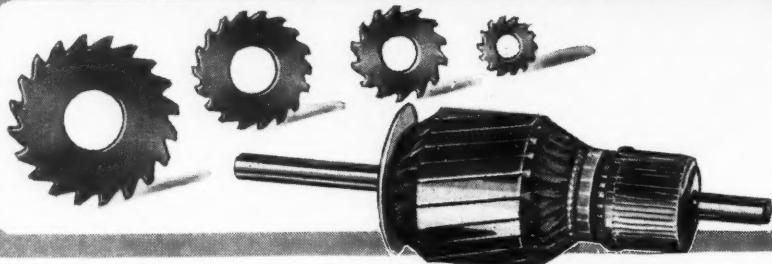
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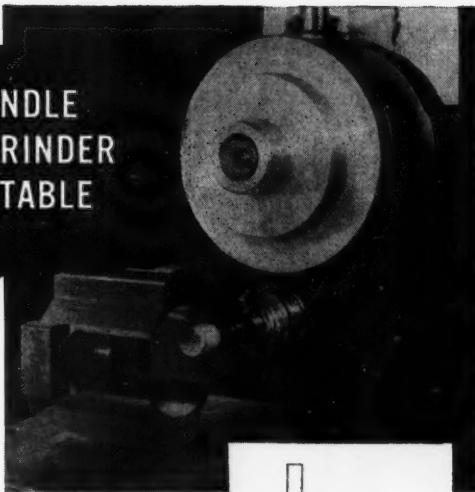
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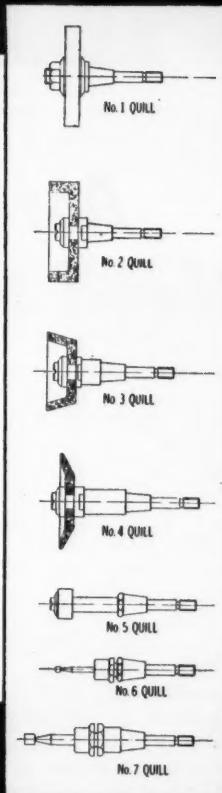
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Reservoir for Spring Water at Dobbs Ferry Plant

Air Conditioning Need Not Be Expensive

By A. S. WILSON

Plant Engineer, Dobbs Ferry Plant, North American Philips Company, Inc.

MARK Twain probably never realized when he made the statement "Everyone talks about the weather and yet no one does anything about it" that twentieth century engineers would accept it as a challenge. The engineers' answer to that challenge has been equipment designed to "condition" air. The equipment available today makes it possible for a manufacturer to condition the air in his plant to suit the requirements of his product or comfort of his workers.

Most of the equipment used in conditioning inside air involves the use of

mechanically operated refrigeration units, but such units are not always necessary. Sometimes a great amount of satisfaction can be obtained from the use of much simpler equipment such as that which was set up at the Dobbs Ferry Plant of the North American Philips Company, Inc.

At its Dobbs Ferry Plant, the North American Philips Company has been making radar equipment for several years, beginning before the war. The plant is located on the site of an old brewery but the present building was erected in 1927 as a publishing plant.

A number of extensive skylights are built into the roof, erected in "V" formation at approximately 45 degree angles. The skylights were intended, of course, to furnish the maximum of light for the printing processes, but in the summer time the light means heat.

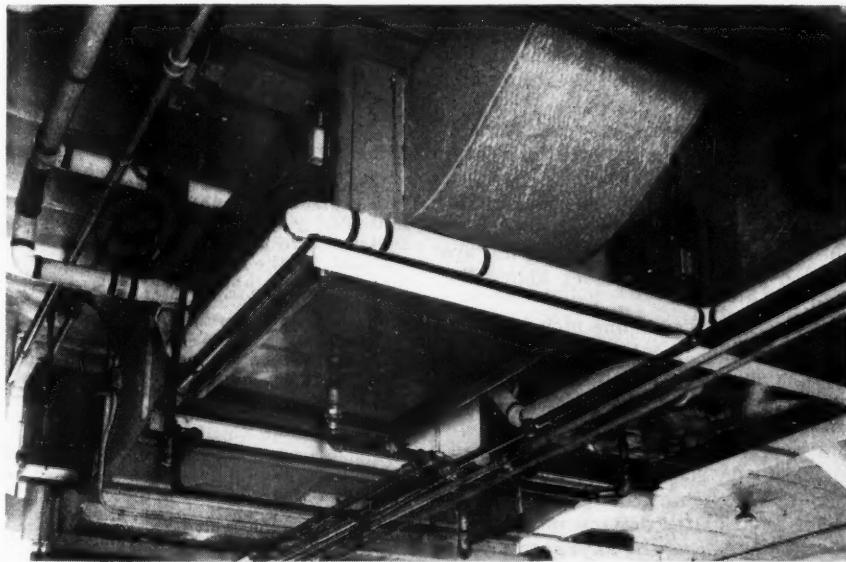
The builders of the old brewery had chosen the site because a spring had been discovered in the adjacent hillside from which a continuous supply of clear, cold water could be drawn. The water from the hillside flowed from an elevation of about 30 feet above the ground floor of the plant. The spring water flowing almost 200 gallons per minute at an average temperature of 48 deg. F. was utilized in the manufacture of the product and also for cooling purposes. The present building was erected in the year 1927 as stated before, and as spring water was not important in the operation of the printing plant the use of the spring was discontinued.

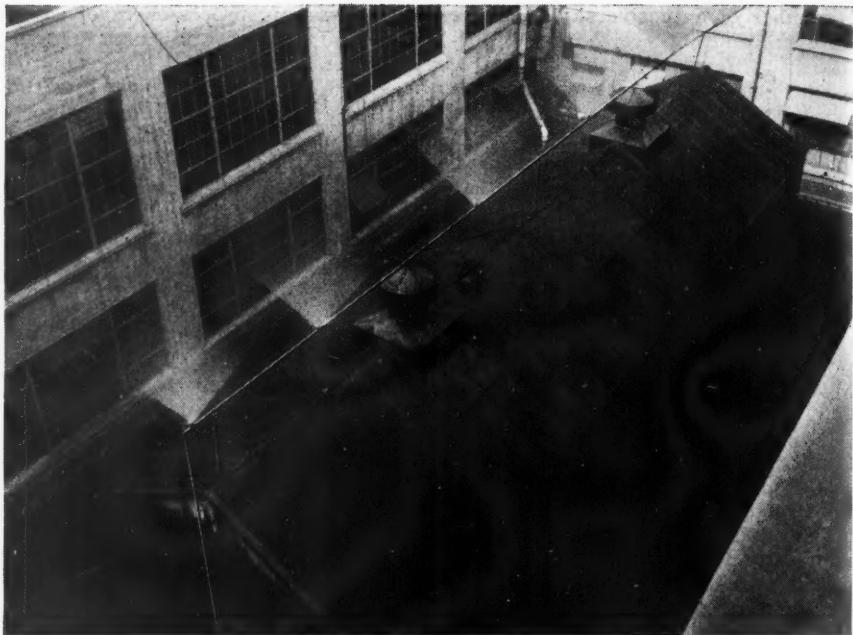
The various processes involved in the manufacture of tubes used in radar equipment necessitated large quantities of water. Wondering whether the old spring would still produce a good volume of clear water, we cut into the old water line and fortunately found it in good condition. New piping was installed to carry the water by gravity to the boiler house and plating departments and a pump was installed to pump the water into storage tanks from which it was drawn for general purposes throughout the manufacturing plant.

Noting the water from the spring was unusually cold, it was decided to utilize it for cooling purposes and to furnish clean air to a laboratory where a constant temperature of 72 deg. is necessary.

As the first step, we installed a separate pumping unit on the spring supply line capable of supplying 40 gallons of water per minute at a pressure

View of Westinghouse Precipitron Which is Used for Purifying Air





View of Sprinkler System Located Above Skylight

of 50 pounds. This water goes through the coils of a 4600 C.F.M. General Electric cooling unit, also through a dehumidifier and a Westinghouse Precipitron.

The water discharged from the coil is carried by one inch pipe lines over the peaks of the two glass skylights of the roof in the "court" sections of the building. Each court is 100 feet long by 40 feet wide and the skylights are peaked to a point 30 feet above the first floor.

Connected to each one inch pipe line are six nozzles, located above the skylight in such position that a fine spray of water from each nozzle will be thrown upward to spread out over the court area and cover the skylight, cooling both the glass in the skylight and the area in each of the courts.

The cold water flowing on the roof of the courts and the skylights lowers

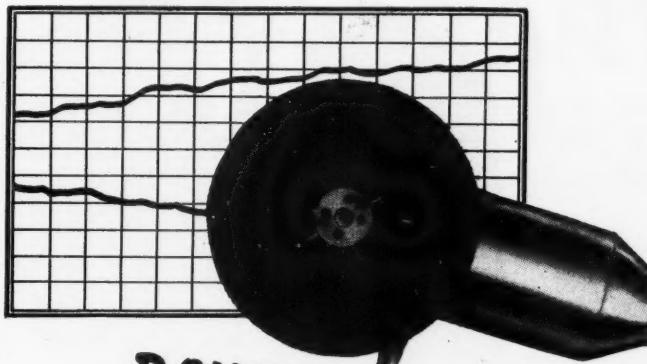
the temperature appreciably. Considering that the system is both effective and inexpensive it might be worthy of consideration in other plants where sufficient water supplies are available.

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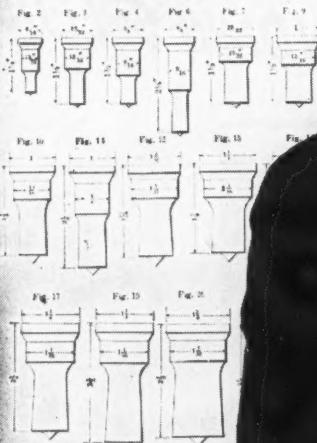
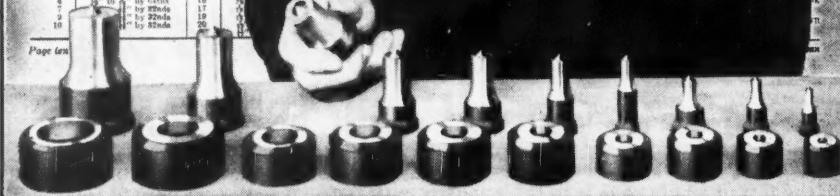


Fig.	Chamfer	Fig.
2	by 48ths	11
3	by 32nds	12
4	by 32nds	13
5	by 16ths	14
6	by 16ths	15
7	by 16ths	16
8	by 16ths	17
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10	by 22ndas	19

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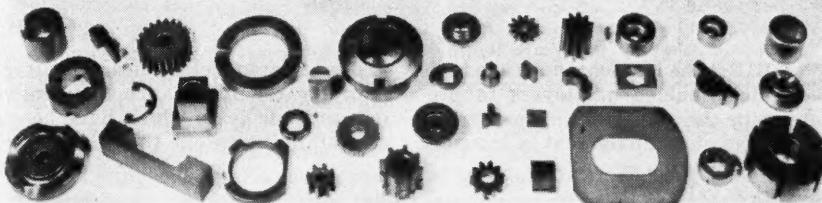
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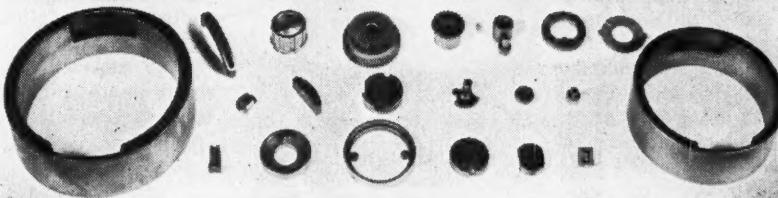
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By GIFFORD MAST
Mast Development Co., Inc.
as told to
FULLER ROSS

DURING the last war, aptitude tests which enabled employers to predetermine the ability of men and women who sought employment in industry were found to be of inestimable value. Some tests proved particularly helpful as a rapid means of determining an individual's mental capacity while other tests were intended to reveal an individual's skill in using his hands. In every instance in which the tests were used, the tests provided the employer with concrete data upon which to base his decision for placing an individual in a job best suited to him.

Evaluation of merit ratings which alone opened up entirely new fields of study is certain to increase industrial efficiency as well as provide increased benefits for masses of workers. Today, job analysis and time study, too, have become an integral and vital part of industrial and commercial activity and management. However, no factor in a

series of personnel studies and surveys is of greater importance than the visual aptitude tests which have become almost universal in their importance to all human activities.

Consider, for example, that regardless of occupation, commercial or industrial, the following figures of visual efficiency as determined by many tests (according to age) prevail:

Under 20 years of age	3 out of 10 persons are deficient
20 to 30 years of age	4 out of 10 persons are deficient
30 to 40 years of age	5 out of 10 persons are deficient

40 to 50 years of age	7 out of 10 persons are deficient
50 to 60 years of age	8 out of 10 persons are deficient

It should be remembered, however, that while visual acuity may be satisfactory in many instances, vision depth defectiveness may increase with age. Great strides have recently been



Gifford Mast

made in improving occupational aptitude surveys through visual or optical methods.

Occupational aptitude surveys are not new in industry. Good progress was made during the war in developing such tests to make them more scientific and adaptable to the present-day personnel needs of highly technical industrial production.

One significant advance along this line has been the development of an occupational visual ability survey technique, a system that not only saves time in processing groups of prospective employees, but also greatly aids the personnel or employment department of any plant in proper placement. While there are variations of this system to meet present-day demands in industry, the occupational vision survey technique which employs an instrument known as the telebinocular has numerous special features.

The technique employed in conducting visual aptitude tests on workers in industry and business has changed considerably since 1940. During the war a foreknowledge and permanent record of an individual worker's visual acuity played an important part in our production program. Nowhere was this more evident than in the Nation's machine shops where visual acuity is one of the vital factors in good workmanship. The system described here is being used at present in such shops as Remington Arms at Denver, Casco Products, Bridgeport Brass Co., and Moore Special Tool Co., all of Bridgeport, Conn. It is also serving in the Chase Metal Works at Waterville, Conn.

Figure 1 shows a view of the telebinocular in use.

The telebinocular visual survey sys-

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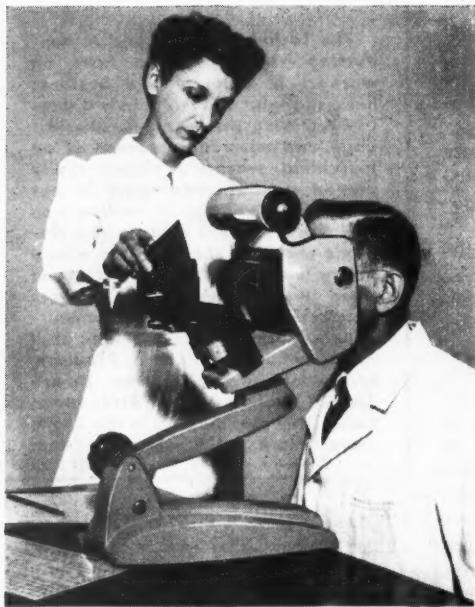


Fig. 1—View of Telebinocular in Use

needed (with particular regard for those problems involving the coordinated use of both eyes—problems of stereopsis) has long been a factor where accurate vision is important. To solve such problems, "standardized" tests for visual aptitudes have been developed as result of many years of testing and correlation of test data upon many thousands of employees. To make the most effective use of the test material that had been worked out the occupational visual survey telebinocular was developed.

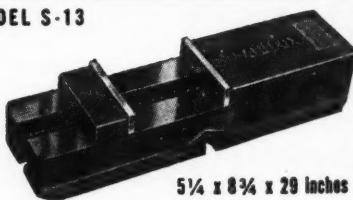
With this new instrument it is possible for the operator to conduct the testing of as many as 100 employees in a single eight-hour day without undue fatigue. The subject sits before the machine, which is then adjusted to his eye height by moving the counterbalanced optical head up or down. The viewing part of the instrument is held at the proper angle by means of a concealed parallelogram adjusting arrangement as this adjustment is made. A magazine of cards is provided at the top of the machine for use in testing

tem has proved its value in thousands upon thousands of occupation tests among employees of leading employers in industry. More than 2,200 industrial concerns with from less than 100 to more than 50,000 employees have already used the system. It is an accepted fact that, among personnel leaders, the system offers an excellent method for "screening" new personnel.

The problems of testing visual ability and recommending correction when

AIRLOX
PNEUMATIC and Hydraulic Vises
Jaw force: 90 times air-line pressure
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production devices, inc.

MODEL S-13



5 1/4 x 8 3/4 x 29 inches

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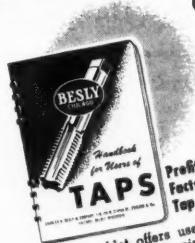
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This handy booklet offers useful information on taps and tapping procedures. It's written by shop men for shop men. Tap fits and drill sizes are listed in detail. Write today on your own letterhead for your copy—free.

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BESLY GRINDERS AND ACCESSORIES

CHAS. H. BESLY & COMPANY, 118-124 N. Clinton St., Chicago 6, Illinois • Factory: Beloit, Wis.

the subject's vision at "far point", that is, when his eyes are focused substantially for infinity. Since the test is designed to check the employee's visual ability at his work, the tests are conducted with the subject wearing glasses if the employee wears glasses at his work.

With the machine set for "far point" vision, tests are made of the vertical alignment of the eye (vertical phoria), acuity of each eye, stereopsis, horizontal alignment (lateral imbalance) and color perception. By turning a knob which is located at the right side of the machine, the optical head is lowered to a normal reading angle. At this angle, the "near point" magazine of test cards is used to check the acuity of the two eyes for lateral imbalance and reading distance. Test results are recorded on a scoring chart from which an accurate inventory of the employee's visual ability is immediately

apparent. This is done by scanning the scoring chart through a transparent scoring matrix.

With this visual ability record in hand, the personnel department knows whether the employee's or prospective employee's vision is equal to the task to which he is to be assigned. If it is not satisfactory, he or she may be directed to an eye specialist who may be able to give him suitable glasses or corrective training.

The results of wisely used visual ability data are as follows:

- (a) More efficient production of a better quality product.
- (b) Placement of men with defective vision in jobs where deficient vision will not interfere with their work.
- (c) Employee satisfaction from working without eye strain at a job within the range of his or her visual ability.

Dealers Being Appointed

THE NEW

ALPHA

TRY-OUT PRESS



For the first time a production-type press for die tryout. Bolster and head tilt for die finishing. Return to original position.

TRIES DIES UNDER
ACTUAL PRODUCTION
CONDITIONS

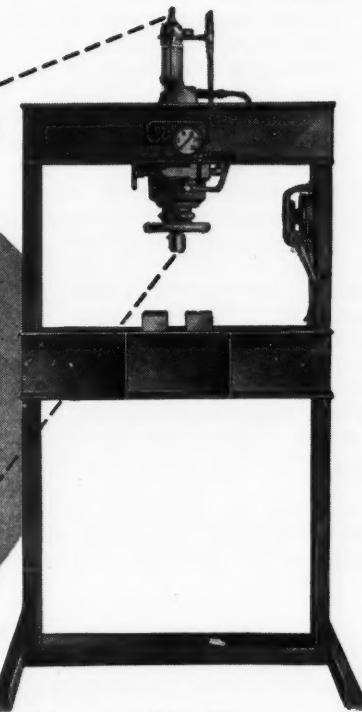
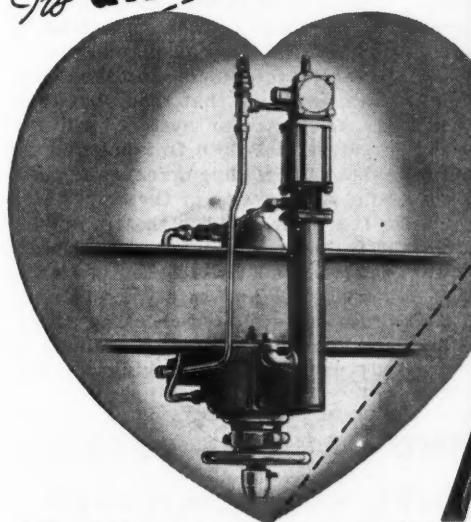
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It's fast!
It's air operated!*



25, 50, or 75 tons with 90 or 145 lb

... air pressure

Newest wrinkle in "quick pressure" is this Dake air-operated hydraulic press. Now every shop with a compressed air supply can have rapid press operation with no hand pumping. The air-operated motor shown in the inset provides speedy pressure, and is easily controlled by a small hand valve.

This new press is available in 25, 50, or 75 tons capacity, and may be used with any 90 or 145 lb air supply. And the price is so low for an automatic operation that you'll be astonished! Mail the coupon today.

DAKE
arbor and hydraulic
PRESSES

Dake Engine Company
612 Seventh St., Grand Haven, Mich.

Please rush me details of your new air-operated presses.

Name _____

Company _____

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City _____

- (d) Reduction of labor turnover resulting from the employee finding himself uncomfortable at work.
- (e) Prevention of seeing accidents which not only result in loss of time and employe distress, but may result in serious mechanical breakdown and loss of production time in the plant.
- (f) Knowledge of which employees warrant expensive training procedures for specialized skilled work.

An ever-increasing number of employers are coming to realize the vital necessity of efficient, effective, as well as speedy appraisals of potential employees' aptitudes. These tests are important from the standpoint not only of product quality and production efficiency, but also from that of plant safety.

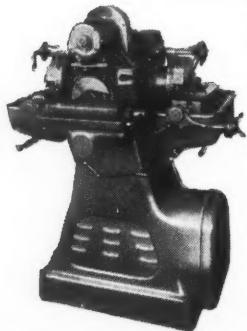
And last, but not least, is the impression that the tests make upon the employee. His attention is brought to

focus on his eyes and he is made aware of the importance of eye protection and hygiene. If he has vision defects—many people see with one eye for years without being conscious of suppressing the vision of a defective eye—the test brings that to his attention and he is encouraged to see his eye specialist.

Some estimates indicate that as high as one-third of the industrial employees in American plants have correctable eye defects, and testing programs such as that made possible by the telebinocular system, will be of great service both to labor and management in finding defects and making employees aware of them.

It will be realized that in our highly technical age, when men as well as machines must be able to function with speed, skill and safety, tests for the processes of (a) rechecking (b) pre-employment (c) pre-placement and (d) visual record making for settle-

HOW TO GRIND CARBIDE CUTTING TOOL BITS ECONOMICALLY



Here's tool grinding at its best!

Employing 3-step progression—rough, semi-finish, and finish or hone—on one machine, this LeMaire 3-Wheel Grinder produces keener edge in fraction of time. Because tools go to diamond wheels in better condition, life of diamond wheels is considerably lengthened. Both labor and wheel costs are reduced—time is saved—production is increased.

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Designers and builders of unit and way type machines for single or multiple spindle drilling, boring, reaming, tapping, etc.—Twin Ram Hydraulic Units—Match-it Gear Chucks.

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- Loosening this one screw enables you to remove all chasers and blocks on the Nameco Vers-O-Tool.

That's part of the reason why, with the Vers-O-Tool, you can change from dull to resharpened chasers and get back into production in *less than 60 seconds*—and be sure the first thread you cut will be precision production!

For more accurate, high-speed thread chasing, here are additional Vers-O-Tool advantages:

1. Vers-O-Tool Ground-Thread Circular Chasers take no longer to sharpen than old-style conventional chasers.
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5. The Vers-O-Tool design is simplicity itself. Fewer parts to wear, fewer adjustments to make, faster regrinds mean longer life, greater accuracy, increased production—and lower threading costs.

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QUEEN CITY
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ment of future compensation claims, is of great importance. Any such plan must, of course, be "sold" to the employees and to prospective employees. In addition a permanent rating card record with parallel job standards requirement should be kept.

"Step Up Production," a 16-page illustrated booklet intended for those engaged in finishing metal parts by grinding and polishing, is announced by the Minnesota Mining & Manufacturing Co., St. Paul 6, Minn. The booklet features the "3M Backstand Method" and contains among other data nine photographic case histories of plants which were able to cut grinding and finishing time from 30 to 80 per cent by adopting this method. Also included are information and pictures regarding the various pieces of equipment which may be adapted to the method and a description of the 3M Methods Engineering Service which is available to those requiring help on grinding problems. Copy free upon request.

"Clean Oil" Vol. III, No. 2. The economic value of oil purification in relation to increasing costs of finding and developing new oil fields is outlined in this issue of "Clean Oil," publication of the Honan-Crane Corp., 682 Wabash Ave., Lebanon, Ind. Also included is a case history of excellent maintenance benefits realized by a national truck-freight firm whose truck-tractors are equipped with Honan-Crane Lubricating Oil Purifiers.

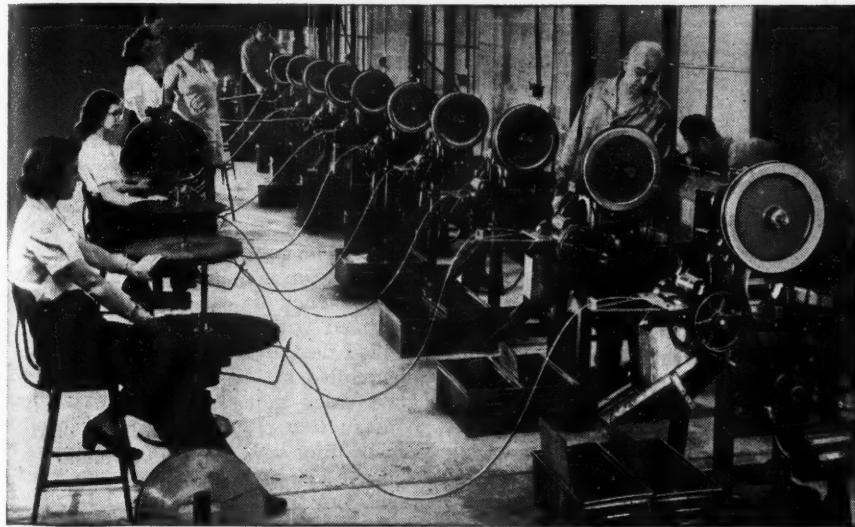
The publication also outlines a complete central purification system for cutting oils which is in service for screw machine departments of a nationally known electrical equipment manufacturer. The system is completely diagrammed, showing how oil is circulated from the 136 machines through settling tanks and purifiers and back to the machines in a continuous circuit. Copy of "Clean Oil" Vol. III, No. 2 is available free to individuals addressing requests on their company letterheads.

Hi-Power Model 77 Portable Electric Drill of $\frac{1}{4}$ -inch capacity is illustrated and described in a leaflet prepared by Portable Electric Tools, Inc., 255-59 W. 79th St., Chicago 20, Ill. Copy free.

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OVER a million stampings per day with this battery of

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THESE 10 PRESSES OCCUPY ONLY 12 FT. x 45 FT.

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May we send you our illustrated circular? It's yours for the asking—an introduction to the solution of your light blanking and forming problems.



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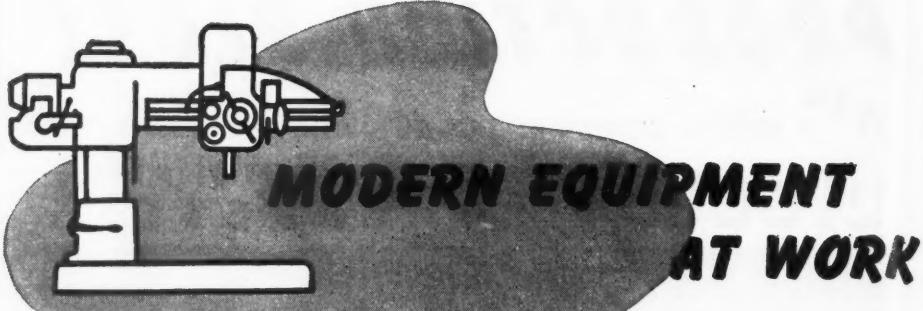
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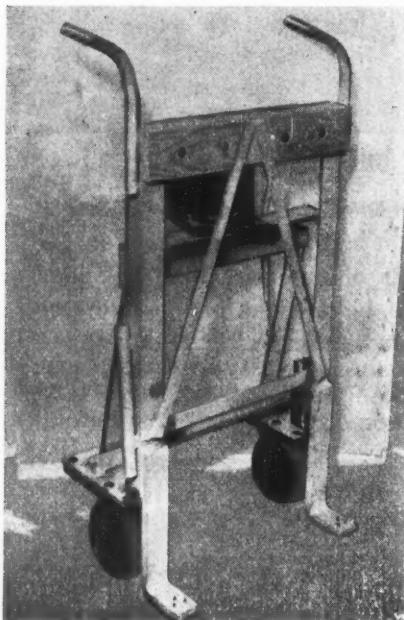
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All-Welded Hand Truck Speeds up Shipping Schedules

(Courtesy Lincoln Electric Company)

THE answer to many problems involving the moving of heavy, bulky crated and uncrated units may be



found in the "Rol-A-Lift"—a two-wheel hand truck made by the Mon-tour Manufacturing Company of Minnesota. The company is now producing the truck on a mass production scale.

The truck is an all-welded unit equipped with a hydraulic lift. The welded design was chosen due to its unequalled rigidity, light weight, and good sales appearance. The welded construction eliminates the necessity for drilling and punching equipment and the use of heavy, expensive castings. The truck can be used to move units weighing up to 6,000 pounds.

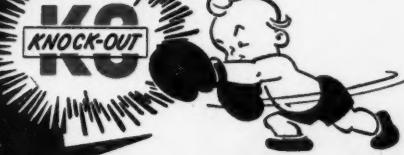
The design of the truck includes two frames, one of which slides on the other. The inner frame is attached to the wheels; the outer, or sliding, frame carries the forks upon which the load rests, and is coupled to a hydraulic lift.

The operation of the "Rol-A-Lift" is simple, and for most jobs it can be handled by one operator. The workman wheels the truck into position, inserts the stub forks underneath the

All-Welded "Rol-A-Lift" truck ready for operation. The welded construction and inner and outer frames can clearly be seen. The hydraulic jack is attached to the top of the inner frame.

KNOCK OUT MORE PRODUCTION WITH "KNOCK-OUT" TOOLS!

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1. Knock-Out REAMER DRIVES

Ram, hone, burnish, lap, etc. Has two-jaw universal chuck (1-5/8"). K-O Keyless Drill Chuck (5/8"). Two models—40-1 and 20-1 gear ratio; speeds 20-120 R.P.M. Speed reducer unit may be purchased separately.

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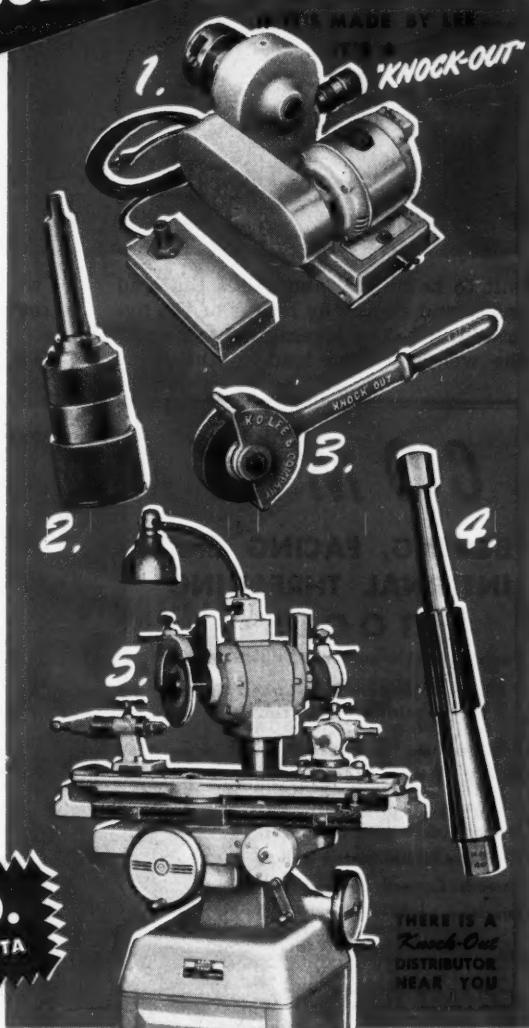
5. Knock-Out UNIVERSAL TOOL GRINDER

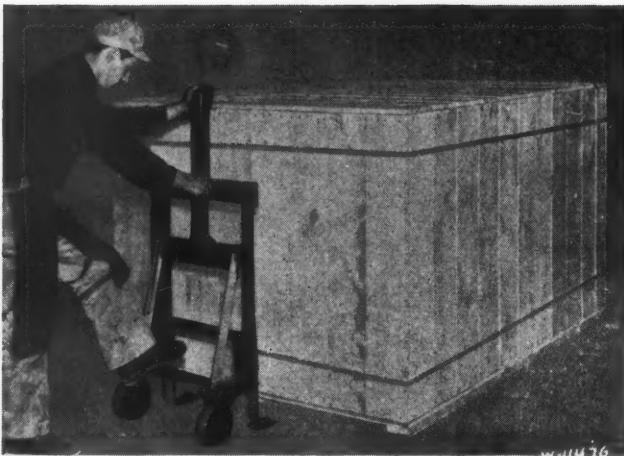
Universal grinders, carbide grinders, and chip-breaker grinders. Models and sizes to fit every shop, large and small. Simple to operate, accurate, ruggedly built for long service.

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ABERDEEN, SOUTH DAKOTA

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One operator can move most loads. If the load is extra large, two trucks are used — one at each end. In this manner loads up to 6,000 pounds can be handled.

unit to be moved, and raises the load easily and simply by means of the hydraulic lift. The leverage obtained by the weight of the load on the forks

on wheels. It can then be moved as required and lowered into position at controlled speed.

SAE 1020 steel is used in the manu-

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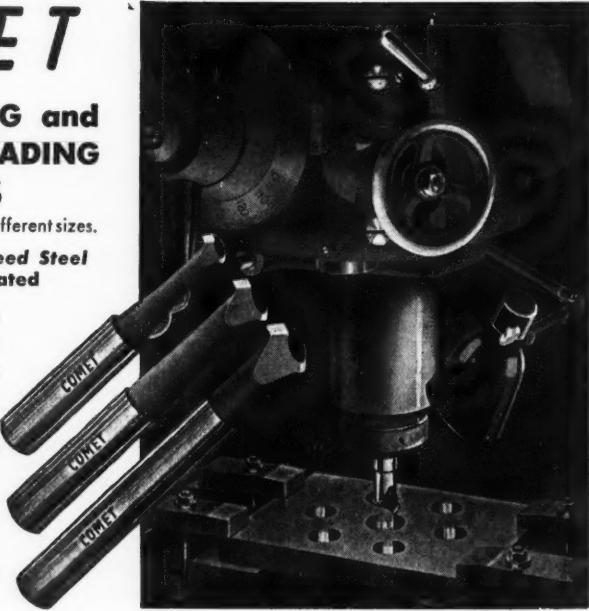
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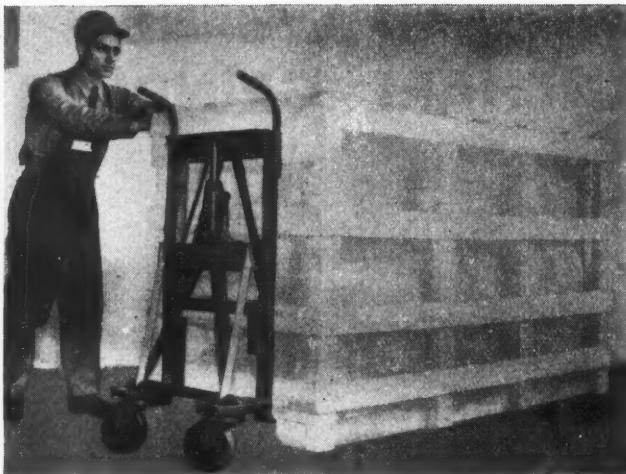


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The operation of the truck is simple. The workman wheels it into position, inserts the stub forks underneath the load and raises it. With a truck at each end, the entire load is on wheels and can easily be moved.

$3\frac{1}{2} \times \frac{1}{4}$ -inch angle. All the flat parts are made from flat stock. The pieces are cut to length and shape by gas-flame cutting. In the

first operation the several pieces are tack-welded, then the unit is sent to the welding department and the

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FOR FAST ACCURATE CUTTING OF
FLAT SHEETS BY TEMPLATE OR TO
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Sheets Tubing
Flat mild $\frac{3}{16}$ " Wall thickness to $\frac{5}{16}$ "
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Eliminates expensive dies.

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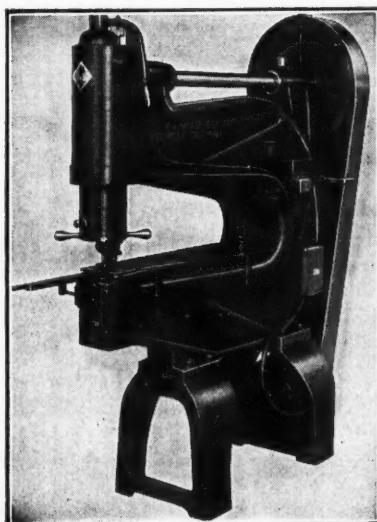
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The all-welded design gives the truck maximum rigidity, coupled with light weight and sales appeal, and also provides an economical method of fabrication.

The construction of the "Rol - A - Lift" involves the building of two frames—outer and inner—for which simple fixtures are used. The use of the fixtures ensures that the frame dimensions will be held to a tolerance of 0.025 inch. All welds are lap or fillet welds. The gas cutting torch is used to cut and shape the pieces because of its speed and because it neither frays nor bends the pieces.

welds are completed. Electrodes of 5/32-inch diameter are used for the tack-welding operation and $\frac{1}{16}$ -inch electrodes—the Lincoln Electric Company's No. E-6012—are used for the final welding. After the final welds have been made, the unit is sandblasted and prepared for shipment.

Standard Radial Cut-Off Machine Converted to Automatic Grooving Unit

GROOVING operations on powdered metal aircraft parts are being performed four times faster now that a standard Walker-Turner radial cut-off

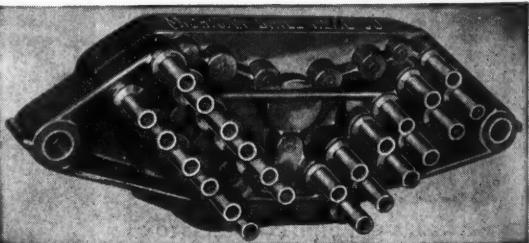
Pictured: a 24-Spindle Heavy-Duty Drill Head.

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We Invite Your Inquiry.

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for Sawing METAL as HARD as a FILE
or Trimming FORMED PARTS
- FAST!

Actual photo of file
friction sawn on
Tannewitz High
Speed Band Saw.

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Cost reductions that are downright amazing are effected in the cutting of an extremely wide variety of materials by friction sawing with TANNEWITZ HIGH SPEED BAND SAWS: flat sheets, hardened or soft steels, armor plate plastics, and many others. Formed aluminum parts can be trimmed without using a rest of any kind. Whatever your cutting problem, chances are it can be done faster and better with TANNEWITZ HIGH SPEED BAND SAWS. Write for booklet: "FRICTION SAWING."



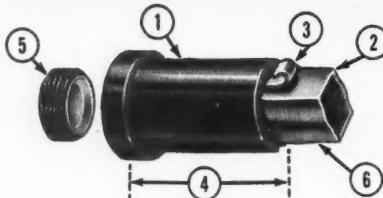
THE TANNEWITZ WORKS
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FOR FRACTIONAL
HORSEPOWER MOTORS

COMPLETE
RANGE OF SIZES . . .

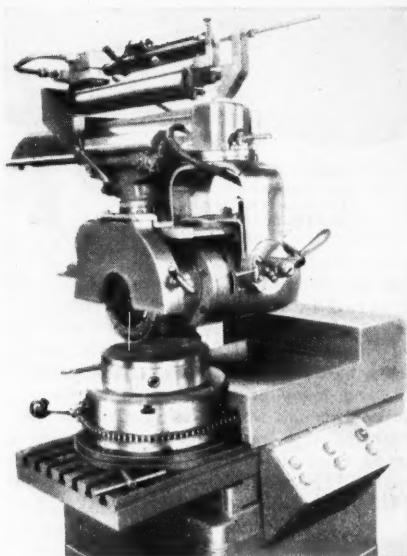


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- WE MAKE...** a simplified brush holder that requires less material, assembly time, and labor... a product proven by over 10 years of wide use.
- YOU GET...** smooth brush action that insures lasting satisfactory performance. Practical—through complete range of sizes. Economical—through reduced all-around costs.

PHOENIX
ELECTRIC MFG. CO.
715 W. LAKE ST. CHICAGO 6, ILL.

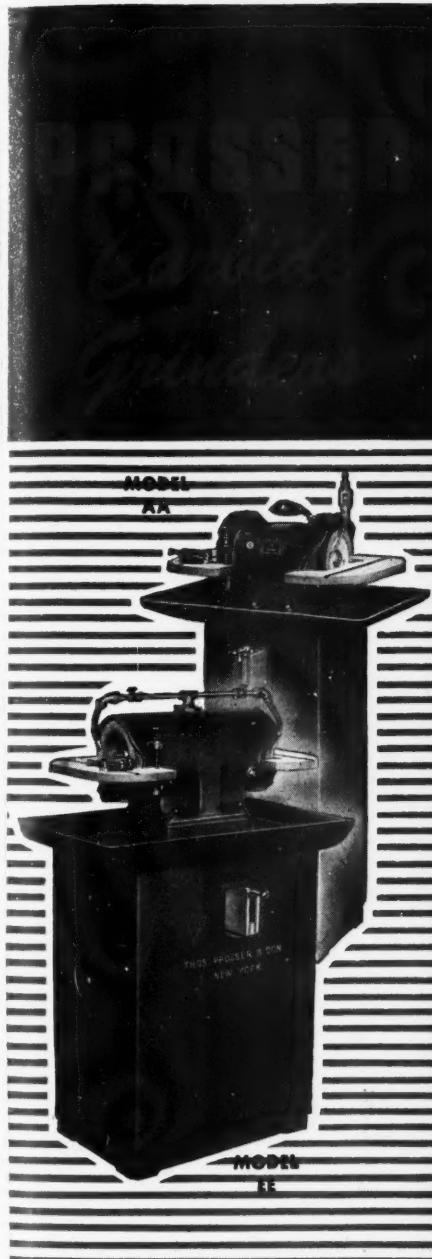
machine has been converted to an automatic grooving unit at the plant of the S. K. Wellman Company, Cleveland, Ohio.

To meet their requirements, Wellman equipped the cut-off machine with a diamond-impregnated metal wheel and a magnetic chuck mounted on an automatic index table as shown in the accompanying illustration. The sliding head is motivated by an air cylinder



Walker-Turner Radical Cut-Off Machine Set Up for Radial Grooving with Magnetic Chuck and Diamond Wheel

with provision for metering the feed. The head moves out and cuts a groove $\frac{1}{8}$ inch wide by 0.010 inch deep in the powdered metal discs and automatically returns to its initial position. Through an electronic sequence control, mounted in the base of the machine, the index table then moves the work to the next position and the cycle of operation repeats itself. Eight radial grooves are made on each side of



For fast, efficient rough grinding and fine finishing of carbides, stellite, high speed steel, and other modern tools, install Prosser Carbide Grinders. Their rugged construction, modern design, and ease of operation insure long, dependable and profitable service.

Prosser Carbide Grinders are built in bench and floor models of several capacities, for wet or dry grinding. Attachments for chip breaker and drill grinding.

Important features include:

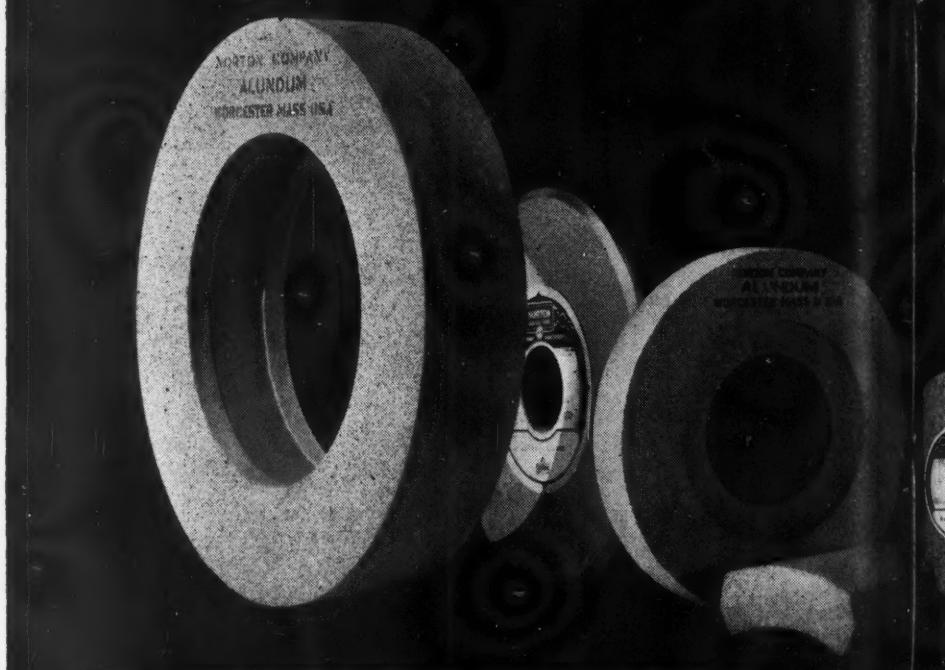
- Quick-acting indexing tables.
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32 ALUNDUM abrasive is entirely different from any other abrasive — made differently by a unique Norton-developed process. There's no crushing to size — each grain forms in the electric furnace as a single, complete, multi-pointed crystal. The result is a wheel that's sharper — that cuts faster and cooler.

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For Cooler Cutting

For Fewer Dressings

For Longer Wheel Life



The cost-cutting ability of 32 ALUNDUM grinding wheels has now been definitely proved — by over a year of steadily increasing use in thousands of plants. They can cut costs for you, too. Try them for cylindrical, centerless, surface, gear, tool and internal grinding. Ask your Norton abrasive engineer or Norton distributor for specific recommendations.

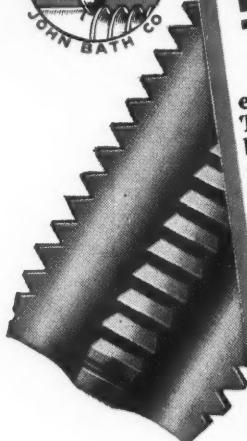
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NORTON ABRASIVES

Photo Courtesy of United Air Lines



IT TAKES SOMETHING EXTRA TO BE A *Specialist!*

There's a wealth of exacting experience behind an airline pilot! There's an equally important background of expert engineering, modern production and skilled manufacturing behind all special and standard BATH ground thread taps — toughened by hardening and tempering — then skillfully ground from the solid!

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the disc and a production rate of three pieces per minute is maintained.

Extremely accurate work can be done with this set-up, according to Wellman. The depth of each groove is held within 0.003 inch and the accuracy of the index within 0.005 inch. A 10-inch diameter wheel is used traveling at 3000 r.p.m. with a feed of approximately 120 inches per minute. The powdered metal discs is bonded to each side of a steel core having an internal spline and measures 5 inches o.d. and $\frac{1}{8}$ inch in overall thickness.

Light machine tools are playing an ever-increasing part in adding to production efficiency. It has been the experience of many plants that their use is limited only by management's ingenuity in adapting them to shop requirements.

Time Saving of 60 Per Cent with Modern Machine Tool

PARALLELING the postwar demands for products of all kinds is the unprecedented demand for hospital equipment, largely due to the national hospital program for wounded and disabled veterans. To meet this need the American Sterilizer Company, Erie, Pennsylvania, is constantly searching for better machines and tools to speed the diversified operations.

One of the latest installations is a 16-inch "electric - cycle" Warner & Swasey screw machine with which the time on some operations is cut as much as 60 per cent. For instance, formerly eight turret ports and eight tools were used in the machining of a $\frac{3}{8}$ -inch brass angle valve. Now four ports are used, two to each end of the piece, made possible by combination tooling and full utilization of the machine's versatility. Hand chucking has been eliminated and mechanical selection

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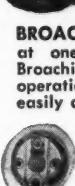
ASSEMBLING — Laminations and rivets squeezed at one stroke. Steady controlled pressure prevents distortion.



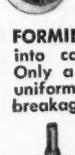
CRIMPING — 4 crimps made at one stroke with no damage to plastic base in assembly of radio tube.



ASSEMBLING — Worm pressed over knurled spindle on venetian blind hardware.



BROACHING — 8 slots broached at one stroke on plastic base. Broaching, slotting and piercing operations on plastics performed easily on A-H Press.



RIVETING — 3 tubular rivets in ceramic base "squeezed with speed" at one stroke. Eliminates danger of damage to ceramic.



FORMING — Field coil squeezed into concave shape from flat. Only a squeeze assures perfect, uniform work, free of tape breakage.



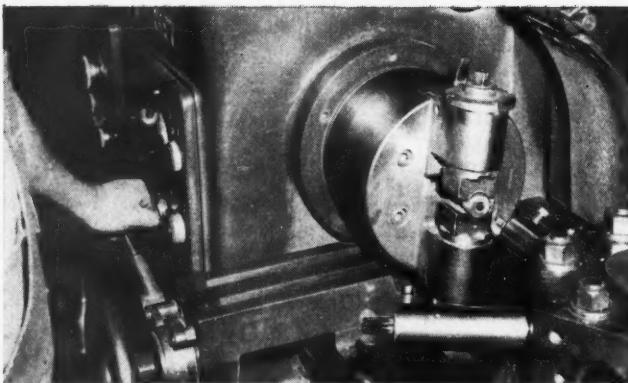
STAKING — Multiple staking operation on metal and Bakelite radio volume control.

Write for our new illustrated Brochure.

 **AIR-HYDRAULICS, INC.**
Port Huron, Michigan

— Sales Office: 401-C Broadway, N. Y. 13 —

MODERN MACHINE SHOP 197



The automatic chucking available with this "electric - cycle" Warner & Swasey turret lathe is one of the important factors in the reduction of operation time by as much as 60 per cent at American Sterilizer Company. The operator has just chucked a brass elbow with his left hand.

of the thread pitch, speed variations, automatic reverse settings and controls for starting and stopping is controlled by push button.

As a result of the ability to set the machine so that it will reverse itself at prearranged stops, the angle valve mentioned above can be machined in

the following sequence of operations, which formerly were impossible; (1) the iron pipe end is bored and faced with a combination tool, then tapped with a solid tap; (2) the turret is manually indexed, then the union end of the valve is finish-seated, bored, faced, chamfered and turned with a combination head.

MODEL No. 16 "SPECIAL"

CONSTRUCTED AS PER SPECIFICATIONS OF U. S.

NAVAL AIRCRAFT FACTORIES

BUTTERFLY FILING and SAWING MACHINE

(Die Making Machine)

This is a very heavy, powerful machine and is designed for extra heavy filing and sawing, but it performs small work just as well. This type of machine is usually adopted in Ammunition Plants, Airplane Factories and machine shops where heavy and precision filing and sawing is desired. We also manufacture smaller models—Model D—10" Table; Model E.L.—12" Table. Model No. 14—14" table and heavy pedestals for all our machines.

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BAND SAWS
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Makers of hand and power hack saw blades
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The third step includes another manual index with automatic positioning, then a combination tool bores two diameters, chamfers the inner and outer surfaces, faces and turns, and finally (4) a combination tap and die with threads of the same pitch finishes the piece, tapping a $\frac{3}{8}$ -18 thread in the



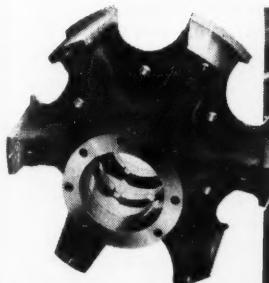
In his right hand the operator holds a combination tool that finish-seats, bores, faces, chamfers and turns the union end of the $\frac{3}{8}$ -inch brass angle valve shown in the operator's left hand.

hole and cutting a $1\frac{5}{8}$ -18 thread on the outside. All the combination tools are carbide-tipped.

Male and female spuds, thread ends, and various types of valves and elbows are also produced on this machine. Union nuts from $1\frac{1}{8}$ inch to $1\frac{1}{2}$ inch in size are made from billets of brass bar stock. The billets are cut to double length with an allowance for parting, thus producing two pieces in each machining operation. The parting is done with a radiac saw, which is faster and cheaper than the screw machine

5,000 Holes per day

with CLE-FORGE HIGH SPEED DRILLS



Three multiple spindle set-ups, one of which is illustrated at the right, are employed to drill the 20 holes in this cast steel truck wheel. An average of 250 wheels are drilled each day—a total of 5,000 holes. CLE-FORGE High Speed Drills are given much of the credit for maintaining this production rate.

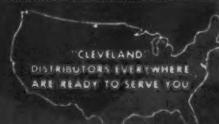


This job is typical of many where CLE-FORGE High Speed Drills have demonstrated their superior performance. Because these drills produce *more holes per grind*, they are an important factor in reducing "down time" and increasing output. If you have not already used CLE-FORGE High Speed Drills and experienced their many advantages, we urge you to . . .

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formerly used. The double pieces are put into the electric cycle machine for the boring, forming and tapping operations, the whole sequence saving an important amount of time over the method and equipment previously employed. The billets are reversed, of course, and the piece is parted for the completion of the two nuts.

Wallace Duplex Angle Bending Machine, product of the Wallace Supplies Manufacturing Co., 1300-12 Diversey Pkwy., Chicago 14, Ill., is the subject of an eight-page bulletin prepared by this firm. In addition to presenting a typical time study based on the production of 100 rectangular frames using the machine, the bulletin includes complete descriptive information on the construction features and advantages of the unit, as well as a table of specifications. Also illustrated and briefly described are hydraulic rotary type tube and pipe benders, ram type benders, and bar benders. Copy of Bulletin No. 34—Section B free upon request.

SKF Machine Tool Bearings and Spindle Design. How anti-friction bearings increase the rigidity and accuracy of machine tool spindles is explained in a comprehensive 60-page catalog of machine tool bearings and spindle designs published by SKF Industries, Inc., Erie Ave. & Front St., Philadelphia 34, Pa. Bearing applications for turning and boring equipment and grinding machines are discussed in detail, including applications for single and multiple spindle lathes, boring heads, milling machines, drill spindles, and bore, O. D., surface, tool and special purpose grinders.

A section devoted to engineering principles relates cutting tool loads to bearing life and also deals with bearing selection, load distribution, speed limitations, mounting, and distribution. Other sections touch upon bearing tables and load data for cylindrical roller, thrust ball and angular contact bearings; tolerance tables; and shaft and housing dimensions. A description of the oil mist lubricator developed by SKF and designed to lengthen the life of spindle bearings from several hundred to as many thousand hours is also contained in the catalog.

Copy of Catalog No. 272 is available free to mechanical executives addressing requests on their company letterheads.

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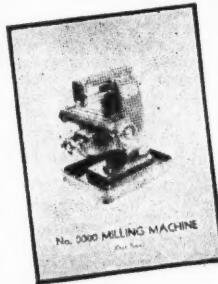


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parts production 70% for "EASY" washers

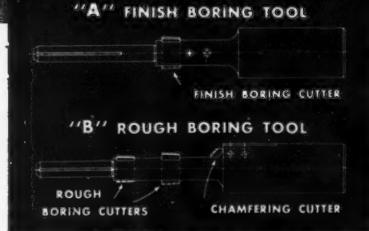


*Completed boring operation

Here's the story: An aluminum casting required the following operations on inside and outside diameters — Rough bore 1st ID — Rough bore 2nd ID — Finish 1st ID — Chamfer ID — Face Shoulder — Turn 1st OD — Turn 2nd OD — Finish 1st OD — Finish 2nd OD — Thread 2nd OD.

Using single point tools, all six of the turret faces were required to finish a single casting. 19.7 parts per hour were completed.

With Madison Boreaming, EASY WASHING MACHINE CORP. was able to accomplish the same machining on three turret faces, permitting two completed castings per turret



revolution. 33.6 parts per hour were completed.

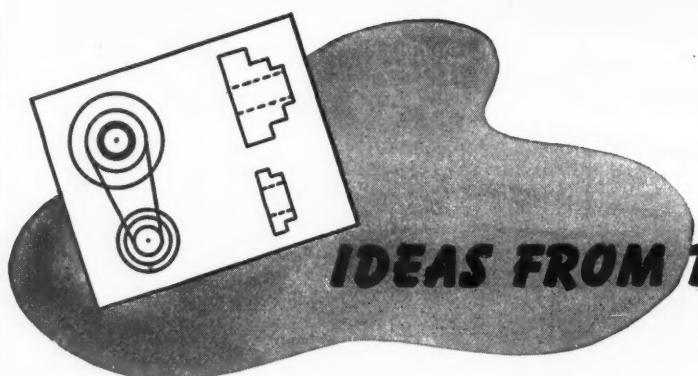
Thus with two Madison tools Easy gained a production increase of 70.5%. Why not put Madison Boreaming to work for you?

Write for the Madison Catalog today. Get the facts on Madison Boreamers, the tools that make one operation out of boring and super finish reaming.



MANUFACTURING COMPANY
DEPT. MM-2 MUSKEGON, MICHIGAN





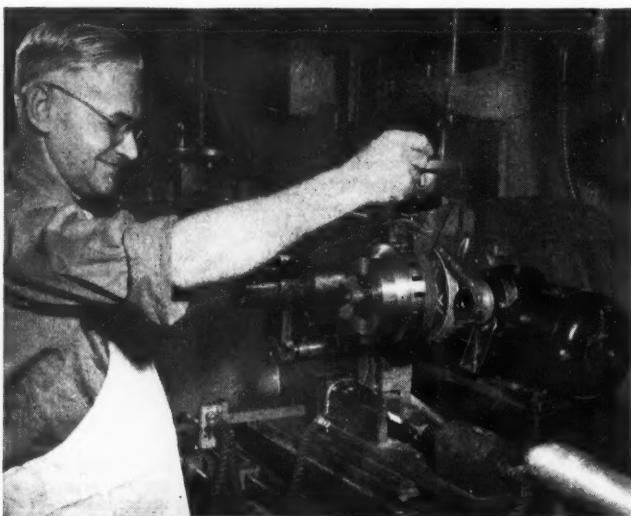
Hopper Feed Fixture for Milling Machine

BY attaching a hopper feed fixture of its own design to a U. S. Miller, the Fairchild Camera & Instrument Corporation, Jamaica, N. Y., has devised a rapid automatic process for milling small round pieces and thus increased the output on this machine 10 to 15 times its former production.

The fixture, shown herewith, can be used for any type milling operation, involving one cut or a double cut. The operator has only to load the hopper, whereas he formerly had to give constant attention to the entire milling process. Besides speeding production, the hopper automatically inspects milling pieces, rejecting any oversized parts not up to pre-set specifications. The operator can remove the rejected

pieces at intervals, before they clog the unit.

The operator pours the small parts into the hopper, which aligns them in correct position for milling. As the hopper rotates, single parts drop into a chute which



Hopper Feed Fixture
Designed by William
Umscheid of Fair-
child's Tool Design
Department

NOW

you can use the
SAME cutter body



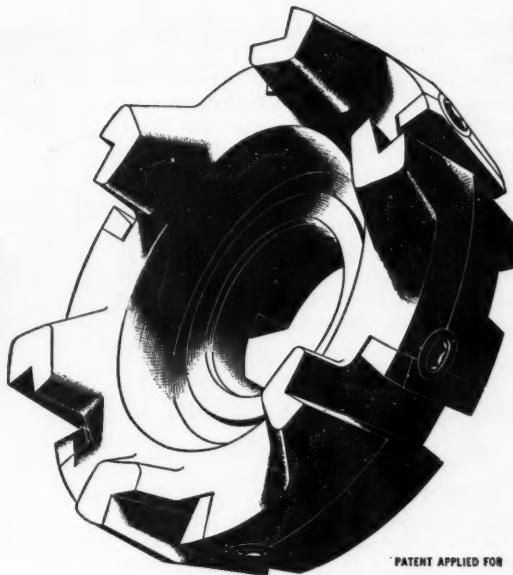
for cutting steel

STANDARD BLADES MX-200

for cutting cast iron

STANDARD BLADES MX-300

for non-ferrous metals



PATENT APPLIED FOR

Once the blades are slipped in and lock screws tightened, your milling cutter is ready to go to work, as blades are furnished with all clearance angles precision-ground. Blades may be re-sharpened individually on a carbide grinder and quickly reassembled in the body, or the assembled cutter may be re-sharpened in the conventional manner on a cutter grinder. Write for illustrated folder which gives complete data and prices.

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*A New Carbide Face Mill Made in
Standard Sizes 5-inch Diameter and over*

REDUCE DOWN-TIME OF YOUR MACHINES

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automatically feeds them into an air vise.

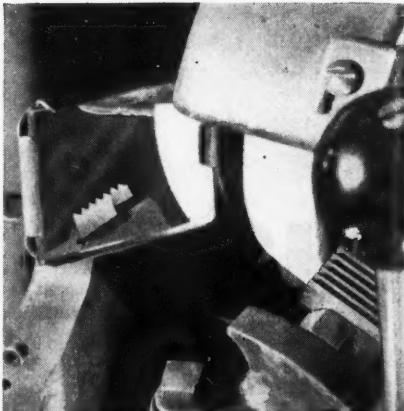
The part is held rigid in the air vise and is ready for cut. With the air vise loaded, an air valve-controlled cam mechanism, mounted to the side of the milling table, automatically controls the movement of the table. The part is then cut, and a blast of air blows the part into a second chute, leading to a container. The air vise then picks up another part from the hopper and the same cycle is repeated.

Mirror Reflects Progress in Grinding Die Chasers

(Courtesy General Electric Company)

MISS Selma May, of the Tool Service Division at General Electric's Pittsfield Works, suggested the installation of an obviously feminine attachment—a mirror—on a die chaser grinding machine. The results were very satisfactory.

Before the mirror was put into use, the machine operator would have to remove the chaser to check the progress of the grind, and then replace it. As shown in the accompanying illustration, the mirror is fastened in a metal holder which is attached to the cover of the cup grinding wheel, located opposite the chaser being ground. This placement reveals the progress of the work to the operator.



Close-up View of Mirror Installed on Grinder

The mirror idea saves one minute per chaser in grinding, in addition to obtaining the correct angle of grind more easily.

Car Wheel "Lift"

By BARTLETT WEST

THE piece of equipment shown in the illustration is an air-operated device developed by the master mechanic at the Angus (Montreal) Works of the Canadian Pacific Railway for use in loading car wheels into freight cars for shipment to various points on



A REAL HELPING HAND

It's a help that die makers, tool makers, machinery builders and general machinists have long sought—a more accurate and surprisingly faster way of transferring blind screw holes.

The Heimann Transfer Screw Set is a self-contained, complete tool. No wrenches or pliers are necessary. Made in $\frac{1}{8}$ " to 1" diameters. Send for price list.



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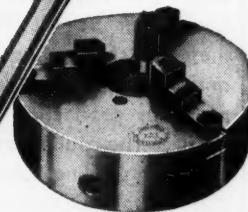
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INDEPENDENT CHUCK
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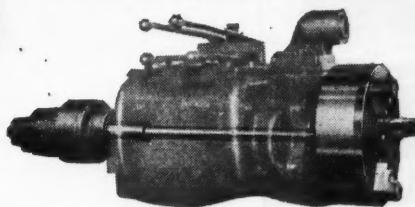
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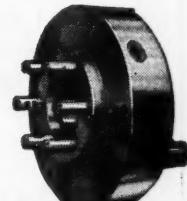
306 Church St., New Britain, Conn.



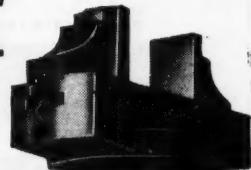
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CHUCK



POWER OPERATED CHUCK



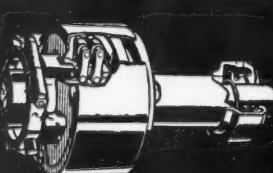
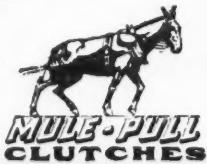
CAM LOCK
CHUCK



TWO JAW CHUCK

SAVES OIL SAVES LABOR SAVES POWER

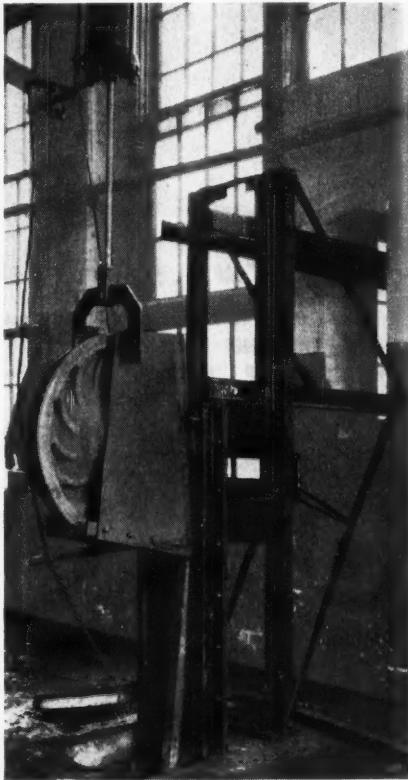
Every purchase dollar you spend for MULE-PULL Clutches is repeatedly paid back to you through the several economies they effect. The Anti-Friction Roller Toggles which actuate these Clutches require no lubrication and develop a powerful pull that promotes production and increased profits. The pulley-carrying sleeves have Ring-Oiling lubrication that is copious without waste and is proportional to the speed; one filling of oil lasts from 30 to 90 days; scored shafting is eliminated, and the time spent by your Oil Man is reduced since your Clutches and Ring-Oiling Shaft Hangers can be oiled at the same time. Send for interesting Bulletin No. 25-M.



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the Canadian Pacific lines. The device is simply an air-operated elevator, consisting of a lift into which a car wheel can be rolled, and which is lifted by means of a Curtis air cylinder. The piston rod of the air cylinder is long enough to lift the wheel to a height

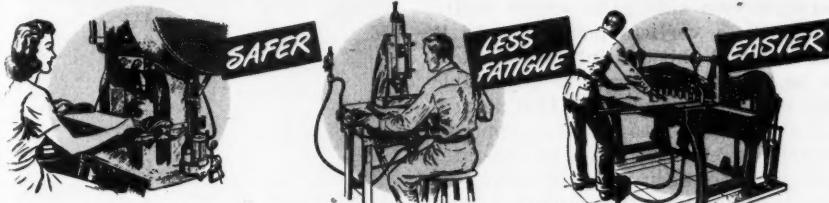


With this air-operated lift one man can load car wheels into a box car.

from which it can roll by gravity into the car. The lift has a slanting bottom to match the slant of the track connecting with the car.

When the wheel is rolled into the lift, it is held in position by a solid back wall between the vertical guides

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upon which the lift rides. As the lift rises to unloading position, the wheel moves by gravity onto the track and between two side rails which maintain it in a vertical position until it has reached the car into which it is to be loaded. The track is adjustable and can be positioned so that it projects 10 inches into the car. Approximately 4 feet of the track at the outer end can be adjusted vertically, by means of an air-operated hoist, to provide for an adjustment to the height of the car floor. Using this equipment, a carload of 130 wheels can be loaded by two men in 1½ hours. Before this equipment was set up, five men were required to load two cars per day.



Attachment for Burrning Drilled Holes

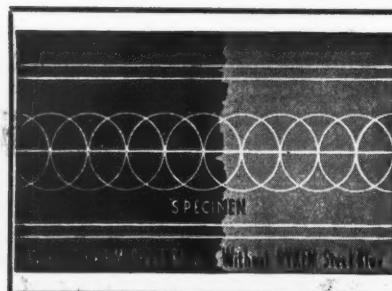
Attachment for Burrning Drilled Holes

By GERALD ELDREDGE STEDMAN

IN Drilling aluminum sheet the drills throw up a burr around the edge of the hole which must be removed to enable the sheets to fit tightly when riveted together, and also on those holes which are dimpled to reduce the cracking of the dimples. Formerly this operation was done by merely turning a larger drill by hand over the burred edge of the drilled hole, thereby cutting the burr off. To speed up the operation, a small countersink cutter and

pilot was devised to do this operation by power as shown in the accompanying illustration. Thus, it is possible with this burring tool to much more rapidly and accurately burr holes. The uniformity of the burring job obtained with this tool has reduced the number of cracked dimples appreciably.

Seco Fluid Power Package, a compact, complete power and control unit for connection to hydraulic presses, is fully illustrated and described in a four-page bulletin released by the Simplex Engineering Co., Zanesville, Ohio. Copy of Bulletin PU free upon request.



DYKEM STEEL BLUE

Stops Losses in Making Dies and Templates

Simply brush on, right at the bench; ready for the layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.

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News of the Industry

IFMA Offers Cash Awards for Technical Papers

The Industrial Furnace Manufacturers Association, 420 Lexington Ave., New York 17, N. Y., announces the "IFMA Prize Contest" to promote the publication of more and better articles in the trade press describing the economic advantages obtained by the use of modern industrial furnaces, kilns, and ovens. Papers published in a trade paper in the United States between October 1, 1947 and September 1, 1948 inclusive will be eligible for prizes.

The articles may be the original or they may be technical society papers subsequently published in trade or technical papers. Competition in the contest is open to all individuals or groups with the single exception that they must not be connected with the industrial furnace, kiln, or oven industry.

The papers will be judged as follows: (a) completeness and accuracy of operating data such as fuel or electricity costs, labor costs, floor space requirements, savings in preceding or subsequent operations, material costs, and so on; (b) concise and complete coverage of improvements in the product, such as physical qualities, appearance, the reduction of rejects or rework, and so on; (c) clearness and completeness of description of equipment, including size, construction, operating cycle, and so on; (d) uniqueness of design with regard to method of operation, material handling, heating, and so on; (e) completeness of description of parts treated, size, material, rate of production, and so on; and (f) in general, the ability for a possible user in the same or similar industry to apply these data to his product or operations, and to determine the possible advantages from his use of the equipment or process.

The awards shall consist of: first prize, \$1,000; second prize, \$300; and third prize, \$200. In addition, special non-cash awards will be made to the magazines publishing the three winning papers. Judges will be appointed by the Industrial Furnace Manufacturers Association, and will be announced before December

31, 1947. The awards will be made and checks sent to the authors of the three best articles on or before February 1, 1949. The decisions of the judges will be final.

Forsberg Makes European Survey of Tool Markets

Mr. Harold Forsberg, president of the Forsberg Manufacturing Co., Bridgeport, Conn., makers of hand tools, recently returned from a three and one-half month tour of the Continent. The trip was made to observe the manufacturing and distribution of hand tools in Europe under today's postwar conditions. Nine countries were visited, from Sweden and Norway to Italy, and many factories, both large and small, in Central Europe. Despite a fair rate of production, most tool manufacturing companies are one to three years behind on orders. Mr. Forsberg visited leading jobbers on his trip, after re-establishing contacts with his prewar representatives in many war-torn countries, and found universally that they hold American-made tools in high regard. With the demand for tools abroad so far in excess of the producing capacities of European factories, the market there would accept huge quantities of U. S. tools, were it not for the scarcity of dollars and import license restrictions.



Harold Forsberg

Schuettler Wants Additional Lines

R. O. Schuettler, manufacturers' agent located at 3713 Camden Ave., Cincinnati 27, Ohio, would like to take on a line of small tools or production specialties.

Silver Streak

Flashing new addition to a famous line

CHICAGO WHEEL & MFG. CO.

Headquarters for
MOUNTED WHEELS and SMALL GRINDING WHEELS



• Here's a sensational grinding wheel . . . it's the startling, shining SILVER STREAK, engineered for super-swift performance, unprecedented efficiency in grinding and finishing; kept constantly FRESH by a protective metallic film! Try it yourself! Stronger than words is the proof you will see for yourself, in your own plant, that the new SILVER STREAK is the wheel you can't afford to pass by, the wheel that solves your grinding problems. Tell us the kind of job you have. We'll send a test SILVER STREAK promptly.

Send for Catalog of Chicago grinding wheels, mounted wheels and tools.

MOUNTED WHEELS
The largest assortment
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- GRINDING WHEELS
- HANDEE, Tool of 1001 Uses
- HI-POWER GRINDER
- The new HANDEE "44"

**CHICAGO WHEEL & MFG. CO., 1101 Monroe St., Dept. MM,
Chicago 7, Illinois.**

- Send Test Wheel for use on _____
 Send catalog of complete line.

Name

Address

Sharp Price Rise Probable for Machine Tools

A sharp rise in dealers' prices of good machine tools is inevitable, the Machinery Dealers National Association was told October 28 by Louis Botwinik, of Botwinik Bros., New Haven, Conn. There is going to be very little desirable, standard, general purpose equipment available, Mr. Botwinik, who was acting chairman for the industry affairs committee of MDNA, said in an address at the semi-annual regional meeting at the Hotel Pennsylvania.

Surplus tool disposal has been the "number one" problem of the industry, Mr. Botwinik pointed out, but no industry member "had the slightest conception of the speed with which this tremendous quantity of modern equipment would be absorbed into our industrial economy. We awaken to find that at present there is very little in standard general purpose tools to be obtained."

Sees Some WAA Dumping

Describing present conditions, Mr. Botwinik continued, "Today, the War Assets Administration is in its throes, and while there will be some dumping of equipment, possibly at auction, but certainly at ne-

gotiated and bid sales, there is going to be very little standard, general purpose tools and equipment available that we generally consider to be the backbone of our business."

The Joint Army and Navy Munitions Board's change of policy, increasing withdrawals of surplus tools from an original quota of 80,000 to the present quota of 200,000 machines, came as a complete surprise to industry members, Mr. Botwinik explained. He said, in warning of present trends, "No one knows whether we are in a post-war or a pre-war era, and, with the market so devoid of good modern tools, it is inevitable that prices will go much higher."

Although there is good demand for machine tools, he declared, "we all can see that the peak of activity is behind us and now the forces of competition will really begin to make themselves felt."

The MDNA is trying to find out what the WAA has in remaining tools, where they are located, and in addition, is trying to work out a new joint cooperative program with WAA under which major prices of machinery sold at auction will be made available to MDNA members as an index of price trends.

NEW DRILLS FROM OLD WITH NU-TANGS



Send us your old drills—we'll make them new again at a fraction of the cost of a new drill! Exclusive NU-TANG® process replaces twisted or broken tangs with brand new tangs of correct size—and with GUARANTEED ORIGINAL STRENGTH. No welding—No distortion—No shortening of drills—No sleeves.

Any drill, reamer, or other tool with a Morse taper in sizes 2 to 6 can be repaired perfectly this quick new way. Delivery—One week. Used by many leading industrial plants. Amazingly low cost—satisfaction guaranteed! Send for complete information.

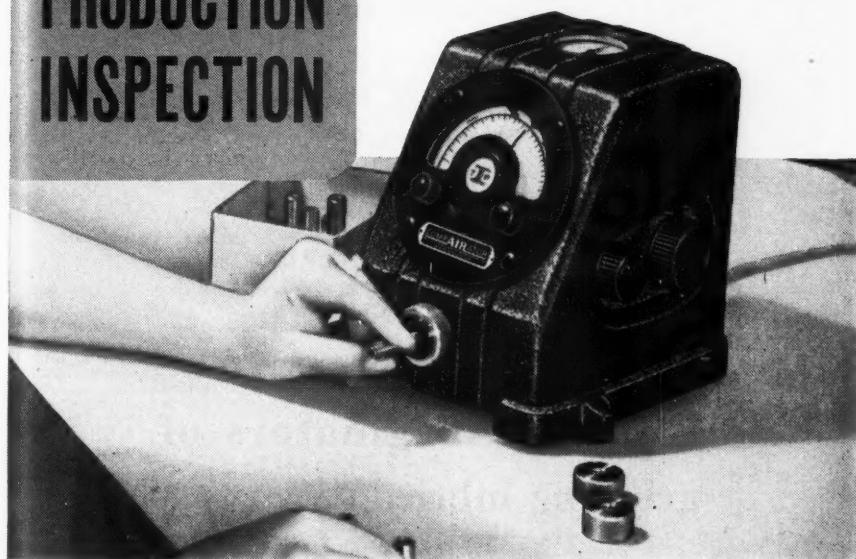
*Patent Pending.

NU-TANGS INC. 1337 Bates Street
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**Speed up
and
Save on
PRODUCTION
INSPECTION**

**...with the New
TAFT-PEIRCE
COMPAIRATOR
AIR GAGE**



Complete and self-contained to include regulator and filter, this modern air gage is 7" wide, 8½" deep, 8" high and weighs only 12 pounds.

All the operator has to do is to attach the hose to the air line. He needs no special skill to operate the gage, which measures without mechanical contact. He easily can check all variations such as taper, out-of-roundness, bell-mouth, and barrel-shaped conditions.

The T-P CompAIRator combines high sensitivity with easy readability. The dial indicator provides accurate readings, free from pointer flutter.

Take the "air-way" to faster and more economical inspection at the machine, at the bench, or in the inspection room. Write for illustrated bulletin on the new CompAIRator to The Taft-Peirce Manufacturing Co., Woonsocket, Rhode Island.



T-P means TOP PRECISION

Use TAFT-PEIRCE Gages for Every Gaging Need...

You, too, may have a water-soluble grinding problem.

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grinding lubricants?

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100 Foster St. 1448 Wabash Ave.
Worcester 8, Mass. Detroit 16, Mich.



AMAZING ALL-PURPOSE ELECTRIC IMPACT TOOL

NO KICK-NO TWIST
EVEN ON THE
TOUGHEST JOB

Drilling with a 1" wood auger. Notice large chips. Action photo taken at f32 and 1/5000 sec. electro-flash.

The sensational new Ingersoll-Rand Electric IMPACT Tool amazes everyone with the easy way it handles tough jobs.*

The patented "rotary impact" mechanism that gives this outstanding performance also assures trouble-free service by permitting the motor to run even if the spindle is completely stalled!

AMAZING! It's reversible . . . full power in either direction . . . runs on 110 V ac-dc.

- * Applies and removes nuts
- Drills
- Reams
- Taps
- Drives and removes screws
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- Runs wire brushes
- Does hole saw work
- Drills brick and masonry
- Drives wood augers
- Uses standard attachments

AMAZING! It saves up to 90% of the time on nut-running operations alone.

AMAZING! With standard attachments, you need only one Impact Tool to do all operations.*

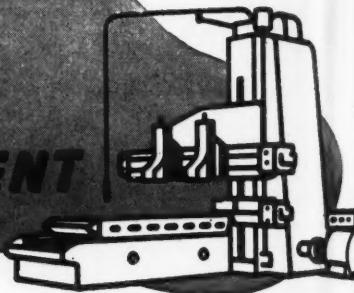
Call your nearest jobber or distributor for a demonstration . . . run it yourself . . . you'll be amazed!

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113-18

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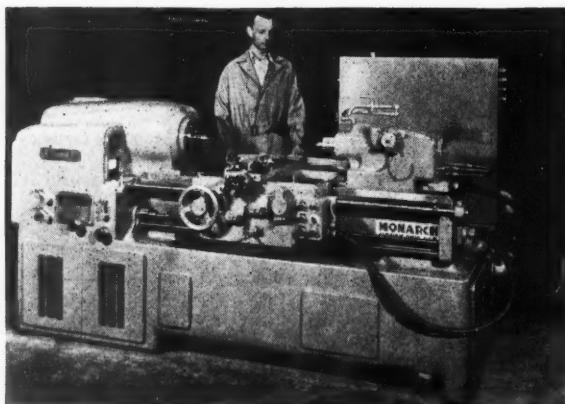
NEW SHOP EQUIPMENT



Monarch 13-Inch Toolmaker's Lathe

Featuring rapid longitudinal and cross traverse control from the apron, hydraulic control of the tailstock as well as of spindle clamping, and provision for constant surface cutting speed, the Monarch 13-Inch Toolmaker's Lathe illustrated herewith has been brought out by The Monarch Machine Tool Co., Sidney, Ohio. Direct current for the $7\frac{1}{2}$ h.p. variable speed drive motor is supplied by an electronically - excited motor - generator set housed within the base. The swing over the bed is $15\frac{1}{2}$ inches; compound rest, $8\frac{1}{4}$ inches. The distance between centers is 30 inches. The weight of the machine including electrical equipment is 6,000 lb.

Through the direct belt drive, the top range of 250 to 2,000 r.p.m. is supplied.



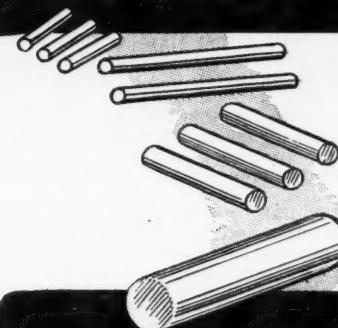
Monarch 13-Inch Toolmaker's Lathe

When the back gearing is utilized, a high, an intermediate, and a low range combined provide a total range of 12.5 to 945 r.p.m. On the front of the headstock and in full view of the operator are both a tachometer and a surface feet per minute indicator. More than ample lubrication at all speeds is supplied by a combined automatic mist and flood system. The American standard 6-inch D-1 Camlock spindle nose enables chucks, plates, and fixtures to be quickly and easily interchanged.

Both the constant surface cutting speed and shifting to the desired speed range are controlled electrically from a point at the right-hand end of the apron. A switch provides the required speed range; another provides either constant surface cutting speed or manual control, while still another is the manual spindle speed control. In the same control grouping are switches for starting, stopping, and reversing the main drive motor. Incorporated in the machine and controlled from the apron is a lead screw reverse mechanism which operates at unusually high speeds.

A refinement is the totally enclosed end gearing which operates in an oil bath. Gear change is speeded by a fixed center

Precision ROD CUTTING at High Speed



with the New
DI-ACRO
ROD PARTER

This newest member of the DI-ACRO family of "DIE-LESS DUPLICATING" Machines brings you accuracy, speed, capacity range and ease of operation fully up to the standards established by DI-ACRO Precision Benders, Brakes, Shears.

Do you require precision?—The DI-ACRO Rod Parter holds tolerance to .001" on duplicated cuts. The ends are square, and roundness is maintained.

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Show parts produced without die expense or delay by DI-ACRO Benders, Brakes, Shears, Rod Parters, Notchers, Punches. Send for your free copy.

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"PARTS OFF" MANY
MATERIALS

All hot and cold rolled rods

Stainless steel

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Copper Brass

Aluminum Bi-metals

Many types of plastics

Fibre Rubber Wood



quadrant which makes it necessary to change but one pair of gears when a change in end gearing is required to permit chasing leads other than those found in the gearbox.

An individually motor - driven rapid traverse unit is located at the left-hand end of the machine. As a consequence, the longitudinal feed control also provides a rapid longitudinal traverse of 100 inches per minute either right or left. Furthermore, the cross-feed control provides a rapid cross traverse of 50 inches per minute either in or out. Apron lubrication is automatically supplied under pressure by a pump which also furnishes oil through copper tubes and metering pins to the bearing surfaces of the carriage and cross slide.

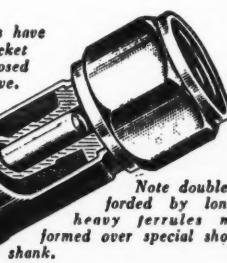
The dials of both the compound and cross slide are graduated in thousandths of diameter and their large size is said to make reading easy and accurate. The swivel is graduated 180 deg. either side of zero. Standard equipment includes the Monarch quick thread chasing stop. Full length taper gibs in the top block and cross slide are provided with double screws for adjusting.

Hydraulic power (from a hydraulic un-

it located in the right-hand end of the base) clamps the tailstock to the bed. When unclamped, spring loaded rollers raise the tailstock several thousandths, thus permitting movement along the bed at the mere touch of a finger. Wipers maintain contact with the bed at all times to prevent the entry of foreign matter. The spindle is clamped hydraulically and its longitudinal movement is hydraulically controlled. Provision is made for a slow feed, used when drilling operations are being performed, and a fast traverse for advancing and retracting the spindle. All hydraulic clamping means are arranged to automatically lock and are said to remain locked even if hydraulic pressure fails.

All parts of the lathe subject to wear are made of alloy steel and hardened. Induction hardening is employed for such parts as the compound screw and the cross-feed screw. An individual motor-driven coolant pump may be readily mounted at the rear of the base. A full range of attachments available for the Monarch 13-Inch Toolmaker's Lathe includes an anti - friction bearing taper turning attachment, multiple indexing faceplate, turrets and chucks of all kinds.

Air-O-cheks have
the ball and socket
joining the enclosed
lever to the valve.



Note double grip af-
forded by long, extra
heavy ferrules machine-
formed over special shoulder on
shank.

Comparison quickly demonstrates such Air-O-chek advantages as leak-proof operation, ease of use, dependability and time saving.

That's why four out of five plants adopt Air-O-chek Air Guns as standard after a comprehensive test.

Try it. Install a dozen Air-O-cheks and compare results with the best you ever had. Prompt delivery on high priority. Sizes for all requirements. Catalog on request.

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AIR-WAY PUMP & EQUIPMENT COMPANY

CUSHMAN ACCRALOCK™



Just what the name implies

- Precision in jaw adjustment to within .001" concentricity.
- Quick, positive lock with the safety and rigidity of a solid jaw.
- Utmost simplicity with few sturdy parts.
- Maintained accuracy because there is little or no wear in operation of "Accralock" units.

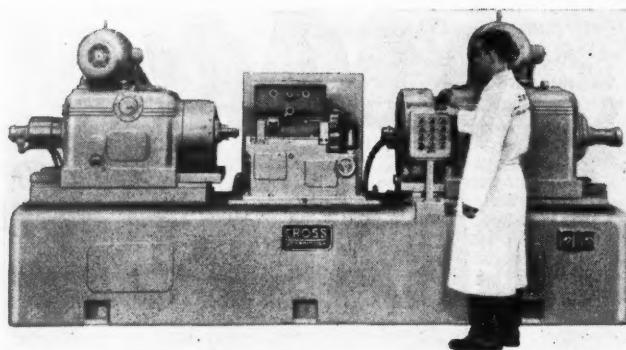
An exclusive feature of

CUSHMAN POWER CHUCKS



Write for Catalog P 0 62

THE CUSHMAN CHUCK COMPANY, HARTFORD 2, CONNECTICUT



Cross Special Cylinder Block Finishing Machine

Cross Special Cylinder Block Finishing Machine

A special machine tool for combining four finishing operations on a cylinder block with clutch housing assembled has been developed by The Cross Co., Detroit 7, Mich. The machine is arranged to simultaneously finish bore, chamfer, and face the clutch housing and straddle face the rear end main bearing thrust faces.

Claimed to have a production of 41

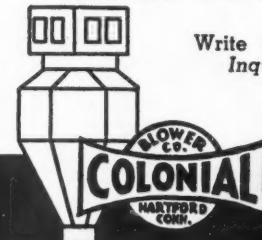
parts net per hour, the machine utilizes standard carbide-tipped tool bits for all operations. Both loading and clamping are effected by power, and the machining cycle is automatic. All traverse and feed movements are hydraulically regulated. Push-button controls are conveniently located in a central station.

For boring and chamfering, a bar feed movement through the center of the right head of the machine is employed. Facing is performed by cross movement of a slide mounted on the same head. As the head revolves, the facing tool is fed out to produce a "phonograph finish" which is said to provide for ideal seating of the gasket at final assembly. The straddle facing operation is performed at the left

DUST COLLECTOR for Surface Grinders, etc.

The Type S is an inexpensive dust collector designed for machines which are used intermittently and which cannot readily be connected to an exhaust system. Easily moved around shop.

The front of the box is a hinged door for easy inspection. Capacity—325 CFM at 3½" W. G. Static suction of 2" W. G. in a suction nozzle with 4' of 3" dia. flexible metal hose. ½ H. P. motor.



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Inquiries from dealers
invited.



COLONIAL BLOWER CO.
17 FRANCIS AVE. • HARTFORD, CONN.



5 COMPARATORS IN ONE!

A Simple, Rigid,
Reliable Instrument
With Many Uses

(Model 108)

Contact Pressure
Can Be Regulated

Entirely
Self-Contained

Anvils Rigidly
Mounted On
Heavy Base

Fine Adjustment
Easily Made With
Wing Handle

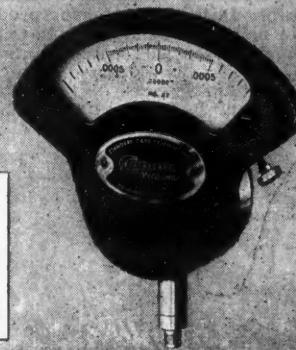


STANDARD *Micronar* INDICATOR

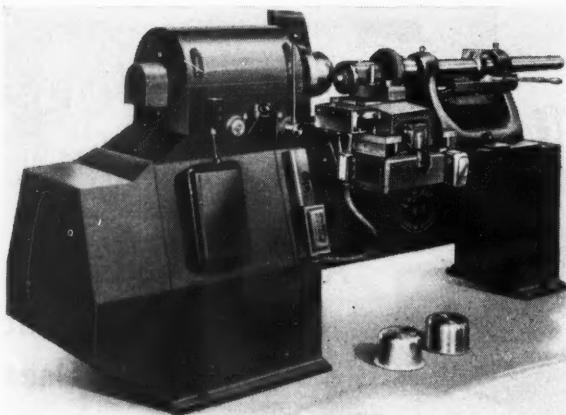
A high amplification, high accuracy instrument, ideal for use on this Comparator.

ENGLISH MODEL
METRIC MODEL

GRADUATED .00002"
(CENTER SECTION) RANGE .0018"
GRADUATED .001 mm. RANGE .04 mm.



STANDARD GAGE CO., Inc., Poughkeepsie, N.Y.



Bliss No. 16 Spinning Lathe
Equipped with Independently
Operated Hydraulic Cross-
Slide Attachment

end of the machine by means of two tools mounted in a toolholder and operating with the cross slide. Dual feed rates are utilized; as the head rotates, the tools are fed out to a predetermined diameter during the roughing cut and then fed back at one-half the original rate for finishing.

Bliss Independently Operated Hydraulic Cross-Slide Attachment

The E. W. Bliss Co., 450 Amsterdam, Detroit 2, Mich., has designed an independently operated hydraulic cross-slide attachment for second-operation spinning lathes. Specially constructed to eliminate operator fatigue, increase production, and ensure part consistency in trimming, beading, curling, or wire rolling operations, the slide is arranged for operation in an automatic cycle with a push-button starter. It is timed to enable trim

cutters, in the rear of the attachment to move in on the part and trim the edge. The cutters, upon completion of their work, automatically retract, thereby allowing the beading or curling attachments to be operated on the part. After the completion of their operation, the curling and beading attachments return to their original position, thus providing free access for shell removal and installation of the next piece.

All strokes and positions of the slide are controlled by adjustable dogs. The power system includes speed and feed adjustments. When desired, the cross-slide attachment can be readily removed from the machine on which it is installed. If requested, the cross-slide attachment can be furnished in Bliss Nos. 15 and 16 spinning lathes.

Pratt & Whitney-Keller Type BG-22 Tracer-Controlled Milling Machine

Having a capacity for machining automotive body dies up to 10 feet long and 5 feet high, the Pratt & Whitney-Keller Type BG-22 Tracer-Controlled Milling Machine illustrated herewith is announced by Pratt & Whitney, Division Niles-Bement - Pond Co., West Hartford 1, Conn. Controlled by a sensitive tracer and operated by simple electrical circuits,

SCHULTZ & ANDERSON
dowel pins

Immediate Delivery!

Standard Size Dowel Pins from $\frac{1}{8}$ " to 1" diameter and from $\frac{3}{8}$ " to 6" length supplied in .0002 and .001 over basic sizes. Unless otherwise specified, .0002 oversize will be furnished.

Dealer inquiries invited.

SCHULTZ & ANDERSON CO.
111 EDISON PLACE NEWARK 5, N. J.

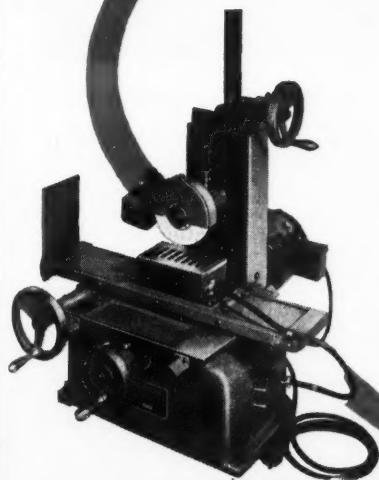
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SANFORD

SURFACE GRINDERS

Model MG

Handles many odd size tool room and production jobs, due to its capacity of 8" x 12" x 12". Actual movements — Transverse $8\frac{3}{4}$ " — Longitudinal 13" — Vertical 12" (under 7" wheel).



BENCH SURFACE GRINDER

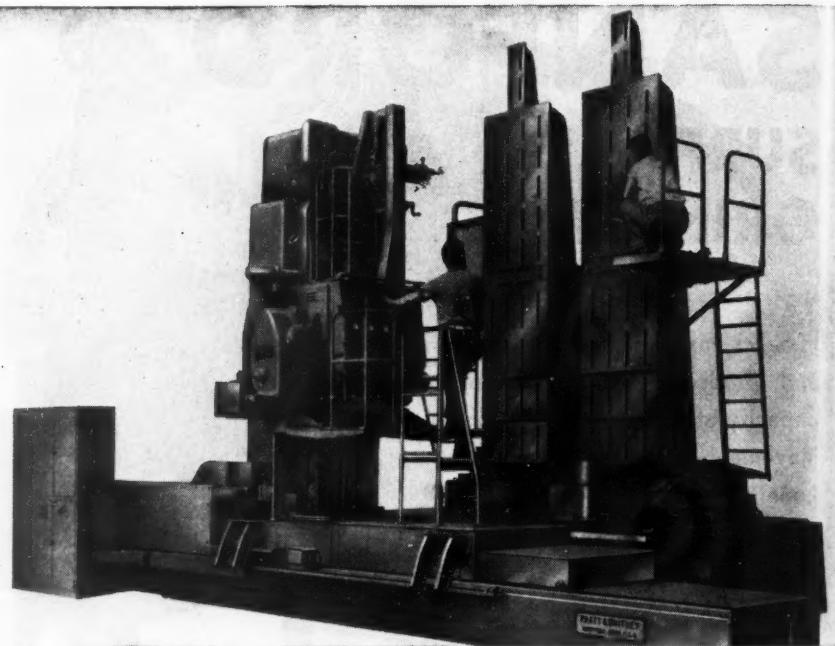
Model SG

A sensitive, highly accurate machine specially designed "for the job that fits in your palm."

Actual movements — Transverse 4" — Longitudinal 8" — Vertical 5" (under 4" wheel).

WRITE FOR COMPLETE DETAILS

SANFORD MANUFACTURING CO.
1021 COMMERCE AVENUE
UNION, NEW JERSEY



Pratt & Whitney-Keller Type BG-22 Tracer-Controlled Milling Machine

the machine is said to accurately and automatically reproduce in metal the shape of a master form or model. The job may consist either of profiling in two dimensions or the reproduction of impressions and reliefs in three dimensions. In each case, as the tracer passes over the master form, the cutter duplicates its path precisely in the work.

The unique electrical control of the Pratt & Whitney-Keller Type BG-22 provides for continuous automatic speed va-

riations and permits machining from models at unusually high speeds and with maximum accuracy. The machine is designed for fast and lasting performance. Complete control of the machine from one main operating station on the spindle head is obtained by concentrating all controls in one panel at this station. An upper platform or station is provided above the main station for the convenience of the operator when setting the tracer and when making other set-up ad-

PRODUCERS OF SCREW MACHINE PRODUCTS TO SPECIFICATIONS

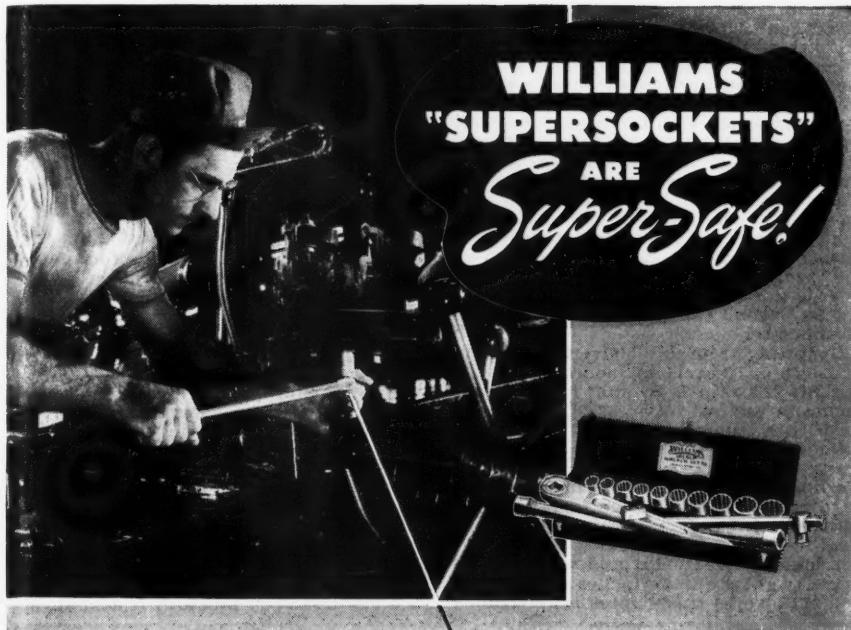
We have:

ONE, FOUR and SIX spindle automatics maximum capacity 2 $\frac{5}{8}$ " round. Hand Screw Machines and Universal Turret Lathes maximum capacity 3" round. Castings and Forgings machined maximum 10" diameter, 8" length, 15 pound weight. Secondary operation equipment for milling, drilling, tapping and assembling. Fabricators of aluminum, brass, steel and their alloys.

WRITE FOR ESTIMATE

SCREW MACHINE SPECIALTY CO.,

• 5700 Butler St., Pittsburgh 1, Pa.

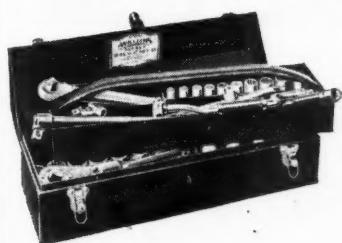


● No type of wrench offers a surer grip than Williams "Supersockets."

This operator knows his wrench can't slip although he is unable to see the cap screw he is loosening. He knows he can apply a hard pull without danger of battered hands or more serious injury. He's a safe and efficient worker because he has safe and efficient tools!

And super-safety is only one feature of Williams "Supersockets." With their endless combinations of handles, accessory parts and sockets, they provide industry's most flexible wrench system. Made in five patterns, with drives from $1/4$ " to 1" square. Sold "by leading Industrial Distributors everywhere.

J. H. WILLIAMS & CO., BUFFALO 7, N. Y.



WILLIAMS
DROP-FORGINGS AND
DROP-FORGED TOOLS

justments. A panel of momentary electrical controls is provided in the tracer bracket at this upper station.

Each angle plate fixture has a fixed platform with a retractable counter-weighted extension which affords maximum convenience to the operator in setting up models. All starters, relays, and other electrical apparatus necessary to the operation of the machine are concentrated in one control cabinet permanently mounted at the left end of the machine bed. Steel platform-type telescoping guards protect the bearing surfaces of the bed. Of safety-tread surface, the guards are roller mounted and move on tracks beyond the ends of the main bed of the machine.

Operating from any conventional polyphase 50 or 60-cycle a.c. source of power, the BG-22 has a horizontal travel of 120 inches, a vertical travel of 60 inches, and an 18-inch transverse travel, with an additional 6 inches obtained by means of a transverse spindle adjustment. The table working surface is 150 x 92 inches. Standard spindle speeds range in 14 changes from 20 to 1,200 r.p.m. Horizontal and vertical feed rates range from $\frac{1}{2}$ to 30 inches per minute; horizontal and vertical fast traverse rates are 250 inches per minute; and transverse travel rates range from 3

to 30 inches per minute. The machine requires approximately 15 h.p. for operation and weighs approximately 50 tons with regular equipment and angle plate fixtures. The unit measures 30 feet long x 16 feet deep x 18 feet high overall.

Monarch 13 x 30-Inch Monamatic Lathe

The Monarch 13 x 30-Inch Monamatic Lathe depicted herewith, product of The Monarch Machine Tool Co., Sidney, Ohio, is designed to provide for a completely automatic machining cycle, as well as automatic loading, the only manual labor required being that of keeping the magazine filled with workpieces. A swiveling Type B "Air-Tracer" is mounted on the front carriage of the machine with the template rail extending along the machine immediately in front of the apron. Adjustable stops on the front vee of the bed control the extent of the longitudinal feed and rapid traverse return through the medium of switches enclosed within the ends of the apron. The automatic air-operated loader is mounted at the rear of the machine. The tailstock is also air op-



MODEL 1236
36 IN. THROAT
12 GAUGE
CAPACITY

CIRCLE
CUTTING
ATTACHMENT
included as
STANDARD
EQUIPMENT
with this
machine

LIBERT MACHINE CO.
GREEN BAY • WISCONSIN

for BETTER
PRODUCTION and
MAINTENANCE
at lower cost

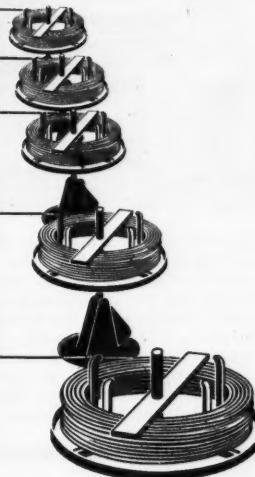
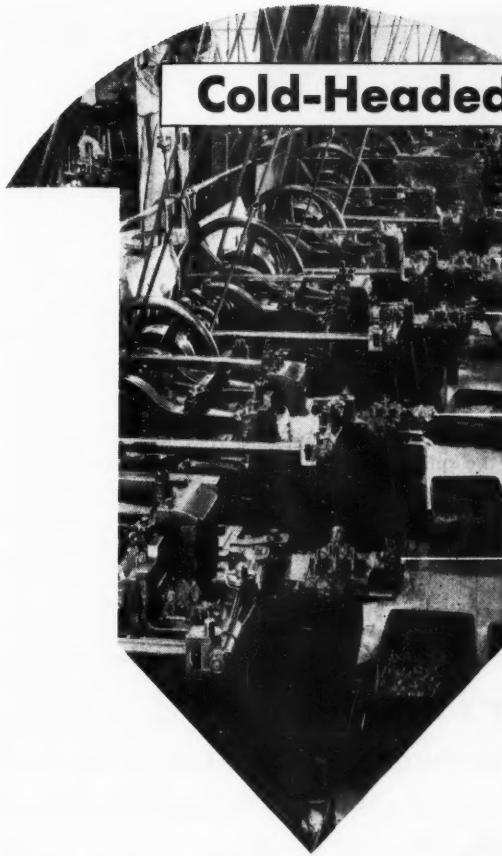
A proved time-saver in any sized shop. Libert's *flexibility* gives you a wider variety of work—clean shearing of flat or formed sheet metal... straight or irregular shapes... inside or outside cuts. Libert *simplicity* means that even unskilled labor soon does accurate work, lots of it *and fast!*

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Made in sizes up to 60 in. throat, 10 gauge capacity

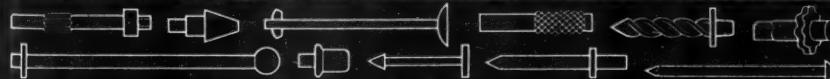
Libert Hi-Speed SHEAR

Cold-Headed Specialties



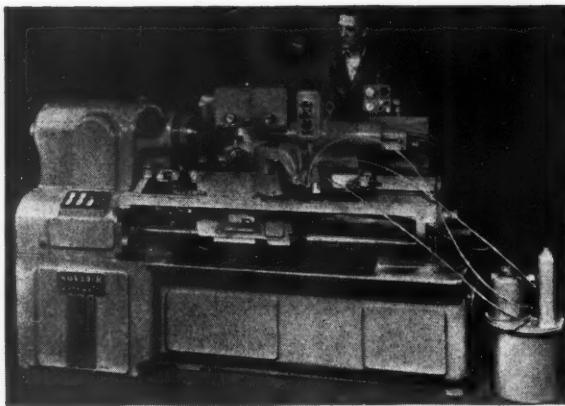
HASSALL special nails, rivets and threaded parts are made from coiled wire stock...Minimum scrap loss, high speed production...Made-to-order headed specialties in large or small quantities...Diameters from 1/32" to 3/8"—lengths up to 6"...Rivets 3/32" diameter and smaller a specialty...Variety of metals, finishes and secondary operations...Tell us what you need...We will answer promptly. **ASK FOR FREE CATALOG.** 3-color Decimal Equivalents Wall Chart free on request.

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MANUFACTURERS OF COLD-HEADED SPECIALTIES—ESTABLISHED 1850

Monarch 13 x 30-Inch Mono-Matic Lathe



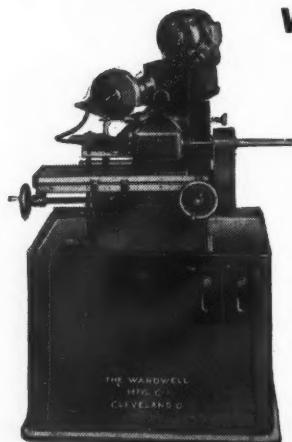
erated, thereby simplifying the timing of the advance and withdrawal of the spindle with the action of the loading arms.

Picking up the machining cycle just as work on one piece has been completed, the operation of the Monarch 13 x 30-Inch Mono-Matic Lathe may be described in the following manner. As the rapid traverse return of the carriage starts, the tailstock center withdraws and the finished

piece drops to a catcher which swings forward from the front of the magazine coincident with the forward movement of a pair of loading arms carrying the next piece to be machined. When the finished piece strikes the catcher, it rolls back, drops into a chute, and is guided to a tote box or other receptacle. The loading arms, meanwhile, continue their forward motion until the workpiece they are carrying is in a centering position. Immediately, the tailstock center advances, pushing the left-hand end of the piece into the serrated work driver. The tool moves in to the cut while the loading arms withdraw into the magazine where another piece is dropped into loading position. As the loading arms return to the magazine, the work catcher folds up against the front of the magazine case to prevent

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slow speed, high torque portable electric power unit

This inexpensive, reversible, power unit, operating on either AC or DC current, develops, through slow speed gearing, a tremendous rotating power.

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drills, reamers, milling cutters, etc.

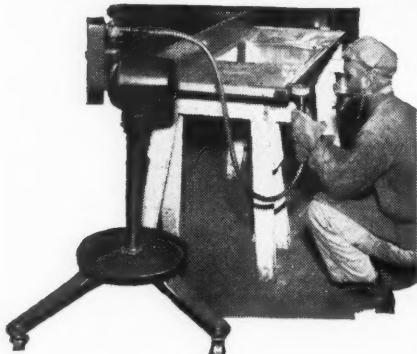
If you have an application that calls for a slow speed, high torque,

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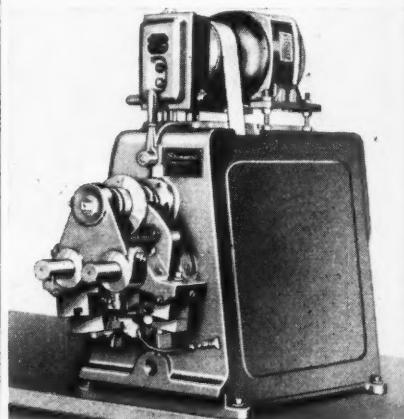
haskins
FLEXIBLE SHAFT EQUIPMENT

its collecting chips during the cut.

The entire cut is performed by a single cutting tool, Air-Tracer guided, which turns two diameters, a taper, an undercut, and a chamfer. The foregoing sequence of operations is repeated on succeeding workpieces until such time as the operator stops the machine by depressing a control button at the front.

Standard No. 2 Automatic Screw Machine

Said to accommodate all normal screw machine operations with the exception of thread cutting on stock up to 1 inch in

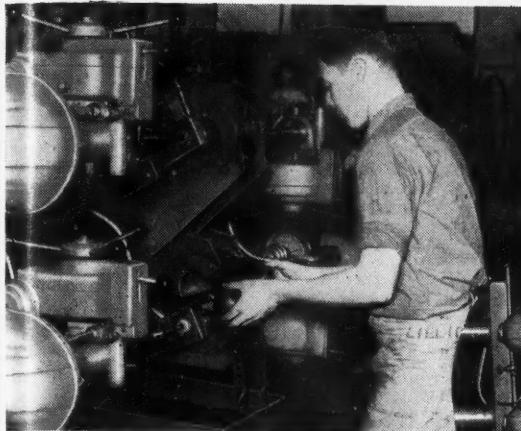


Standard No. 2 Automatic Screw Machine

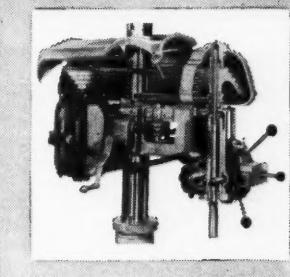
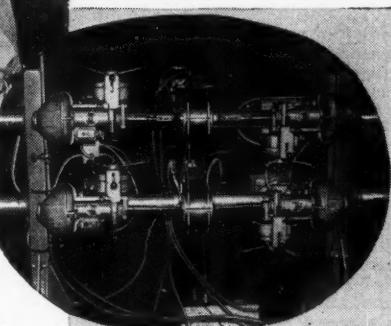
diameter, the Standard No. 2 Automatic Screw Machine illustrated herewith, product of the Standard Machinery Co., 1543 Elmwood Ave., Providence, R. I., features a method of driving the feed camshaft which is said to render impossible the formation and clogging of long chips. Of value in working any metal or material, the chip-breaking feature is claimed to be of particular importance in machining plastics and other materials which tend to form long, troublesome chips. Twice in each revolution of the spindle, the rotation of the feed camshaft is interrupted, thereby effecting an intermittent feed which breaks each chip as it is formed. The tool dwells at the end of its movement while the work is made accurately cylindrical and provided with a smooth surface finish.

700% PRODUCTION INCREASE...

with STANDARD
WALKER-TURNER
DRILL HEADS



Eight separate operations are consolidated into one by using four STANDARD Walker-Turner 20" Power Feed Drill Heads, mounted horizontally, to drill both ends of two double end tube closures simultaneously.



01100X—20" Power Feed Drill Head Unit.
Five standard spindle speeds, 400 to 2600
r.p.m. with 1740 r.p.m. motor.

*Price, less motor \$216.00

"We have been amazed at the economies obtained by incorporating standard Walker-Turner 20" Power Feed Drill Heads in a special set-up which we designed," says Mr. A. G. Stahl of the Engineering Department of the Tube Manifold Corporation, Buffalo, N. Y.

"In drilling double end tube closures, eight operations were consolidated into one. With a single operator, production has been increased 700%.

"We prefer Walker-Turner Drill Presses because of the added advantages of the ten spline spindle with no play, the six inch spindle travel and wide speed ranges. The low initial cost of these machines and their adaptability for special set-ups have solved many of our production cost problems."

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METAL-CUTTING BAND SAWS • POLISHING LATHES • FLEXIBLE SHAFT MACHINES
RADIAL CUT OFF MACHINES FOR METAL • MOTORS • BELT & DISC SURFACERS

The basic machine, as shown in the accompanying illustration, performs two separate forming operations or a roughing cut followed by a finishing cut and cut-off operation. The control and movement of tools are effected at easily selected rates and without gearing. Feeds are available in small increments within the unit's capacity. The feed camshaft can be disengaged instantly and rotated slowly by hand for the setting of tools. Holders are available for all types of tool shanks. The tools are reset against adjusted stops provided in the holder for fast tool replacement. Commercial types of collets and feed fingers are employed.

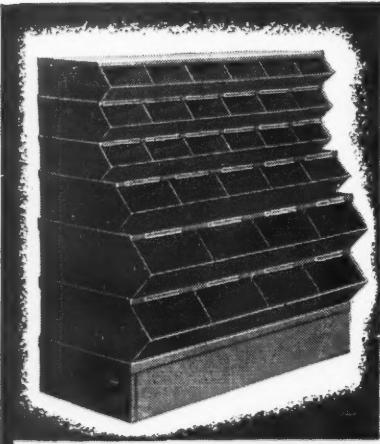
To provide for maximum operating efficiency, all controls, tool mechanisms, cams, and adjustments are located at the front of the machine. Bar stock can be readily introduced to the feed tube by the operator from the front. Butt ends of bar stock are ejected by manual control. The machine is designed to provide for instantaneous advancement of bar materials up to 4 inches in length. Special feeds for work up to 9 inches in length can be provided. Parts produced in preliminary operations, including cut-off, can be hopped into an automatic feed for adjoining machine setup to accommodate additional operations. A signal

light indicates when the stock runs out, at which time the tool feed is automatically disengaged.

Designed for mounting on a bench, the Standard No. 2 Automatic Screw Machine includes a 1½ h.p. motor with manual starter and a motor sheave arranged for a spindle speed of 900 r.p.m. unless otherwise specified. The attachments available as special equipment may be applied directly to the basic unit without alterations and include a drilling or boring tool actuated by an extra cam, and an anti-friction stock stop with steady rest feature. A fabricated steel base with integral coolant tank, motor-driven coolant pump, and removable splash guards is furnished for single unit installations.

Cincinnati 8 x 18-Inch Tool and Die Milling Machine

The Cincinnati Milling Machine Co., Cincinnati 9, Ohio, announces an 8 x 18-inch tool and die milling machine designed for the rapid, economical production of plastic molds, permanent molds, metal patterns, die casting dies, and small drop-forging dies. Features of the machine in-



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Manufacturing Engineers

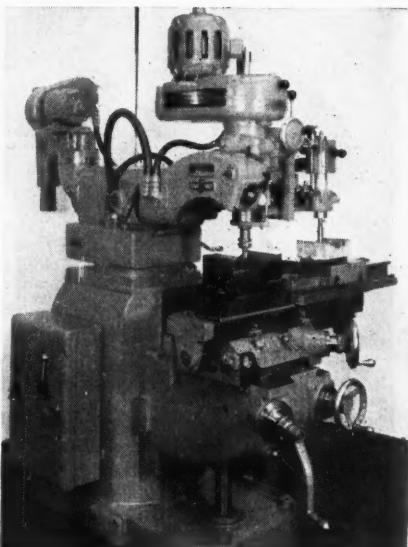
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clude a sensitive hydraulic tracer mechanism which provides for automatic duplication of intricate shapes with a high degree of accuracy. Tracer finger contact pressure is very light to permit the use of wood, plaster of paris, or other soft, easily worked materials for the master shape.

Physical effort of operation has been reduced to a minimum by the convenient location of all controls and the use of an anti-friction ball bearing lead screw and nut for saddle and table movements. Delicate "feel" of cutter action is said to be obtained through the smooth, sensitive anti-friction control of the table and saddle.



Cincinnati 8 x 18-Inch Tool and Die
Milling Machine

dle. Pickfeed for saddle movement is available if desired. This attachment is claimed to reduce indexing time from cut to cut and to provide for evenly spaced feed progression lines.

The spindle carrier is mounted on a transversely adjustable ram, the rear portion of which is provided with a mounting surface for a slotting attachment. The ram is, in turn, mounted on a swiveling turret which permits the slotting attachment to be instantly swung into position over the machine table, thereby elimina-

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ting the necessity for another setup on jobs requiring slotting operations. The slotting attachment is universally mounted on a double swivel and has its own individual motor drive.

A wide range of angular milling jobs can be performed by a unique, double swivel arrangement of the spindle head, in which the head swings on segments of circles, the centers of which lie close to the tip of the cutter. Thus, the cutter remains close to the original position even when swiveled to maximum angle.

Flexible spindle quill positioning is obtained with a slow-feed handwheel control for boring operations, while rapid hand lever positioning is afforded for use of the machine as a sensitive drill. A dial indicator depth gage provides for accurate visual indication of vertical adjustments of the cutter. A single control lever at the front of the machine is used in selecting a high series or low series of spindle speeds and direction of spindle rotation. A simple positive spindle lock is provided which is especially useful for rapid changing of cutters when using straight shank cutters with a collet adapter attachment.

Pull-out type micrometer dials are provided for the table and saddle handwheels. Adjustable limiting stops, with

micrometer screw adjustment, are provided for saddle and table movements for accurate positioning of slides for repetitive cuts.

The tracer mechanism can be quickly disconnected from the spindle carrier by a single bolt for general vertical milling operations. If desired, the tracer mechanism can be entirely removed from the spindle carrier and mounted on a supporting bracket on the column without disconnecting any hydraulic lines. A right and left-hand attachment is available for making left-hand reproductions from right-hand masters or vice versa.

The general structure of the machine is of the knee and column type, the column being truncated to provide for the turret and ram mounting of the spindle head. The knee is a box-section shape of heavy proportions, and an apron type extension provides additional length of bearing on the column to provide for extra strength and rigidity.

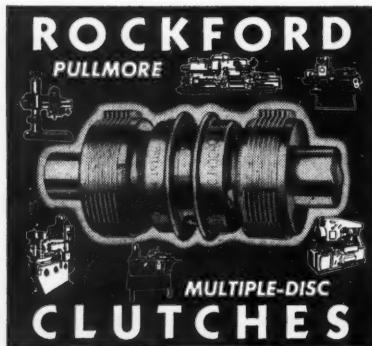
The tank, pump, motor, and relief valves comprising the hydraulic power unit are housed within the machine column. The hydraulic circuit involves only three hydraulic lines between the pump unit and the tracer mechanism.

Ten spindle speeds are available, ranging from 225 to 4,000 r.p.m. The spindle is

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In writing for the Free Data Bulletin on the "340," why not send us a sample part for our recommendations and analysis. Address Bear Mfg. Co., Dept. M-25, Rock Island, Illinois.

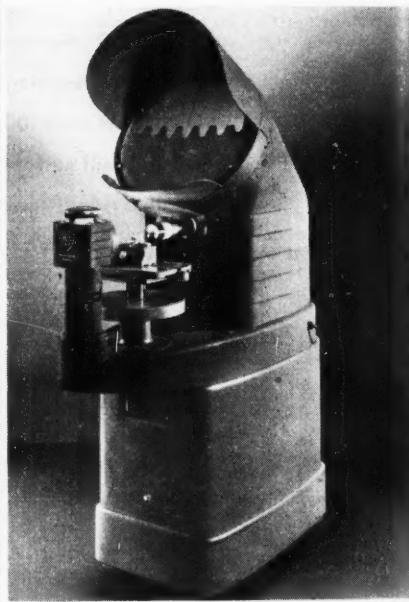


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driven by a V-belt, and speed changes are made by means of a two-speed motor and a pair of five-step sheaves.

AO Optical Projection Comparator

Engineers Specialties Division, The Universal Engraving & Colorplate Co., Inc., 980 Ellicott St., Buffalo 8, N. Y., is now distributing an optical projection comparator which can be used either on



AO Optical Projection Comparator

a bench or its own pedestal and is said to be adaptable to all uses either for the inspection of production pieces or as a microscopically precise measuring device. Designed and made by the American Optical Company, the comparator as illustrated is a basic unit suitable for the production line. It can, by the addition of a micrometer stage and protractor, be converted to a measuring instrument that is claimed to be suitable for the finest tool and gage laboratories.

Light in weight to allow for easy portability, the AO Optical Projection Comparator is said to include the following

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When tapping at high speeds, this ground thread tap will usually produce at least 6 times as many threaded holes as a cut thread tap... with less power, less sharpening, less breakage.



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aluminum; and retractable roller bearing castings which enable the unit to be easily moved about the plant.

Special staging fixtures and coordinated chart gages are available for use with the comparator to facilitate complex inspection operations.

Monarch Uni-Matic Lathe with "Air-Tracing" Attachment

Product of The Monarch Machine Tool Co., Sidney, Ohio, the machine shown in the accompanying illustration is a special adaptation of a 2,000 r.p.m. Monarch Uni-Matic Lathe to a between-centers job employing the Type B "Air-Tracer" principle to control the motion of the cutting tool. The part shown, a small two-throw compressor crankshaft, is chucked on the flanged end and supported by a tailstock at the pulley end. The overall length of the crankshaft is 10½ inches, and the length of the pulley end section is 4¾ inches. A chamfer, multiple diameters, tapers, radii, and shoulders are turned by a continuous single tool cut. The machining cycle is fully automatic, the operator

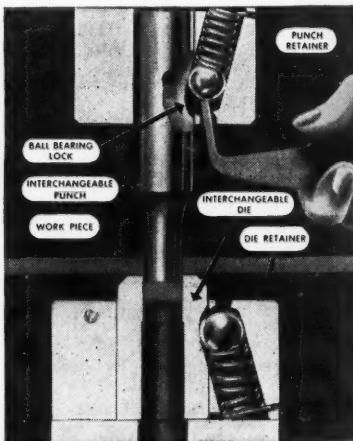


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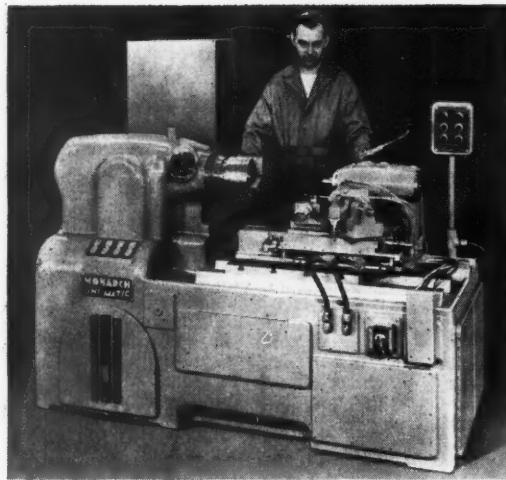
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Monarch Uni-Matic Lathe with "Air-Tracing" Attachment

ployed for longitudinal feed and rapid traverse return. The longitudinal feed range is $\frac{1}{4}$ to 10 inches per minute, while the rapid traverse return is 70 inches per minute.

Cleveland Model E Tapping Machine

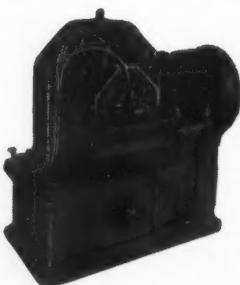
Designated as the Model E, a tapping machine employing an interchangeable lead screw feed is announced by The Cleveland Tapping Machine Co., Hartville, Ohio. In addition to single-hole tapping at high speeds and with minimum

scrap loss, the machine is designed for efficient use with multiple heads for tapping groups of holes, even of different sizes, with a single stroke of the spindle. Adjustable heads may be used where the pattern of the hole varies in production,

having nothing more to do than load the work, depress the cycle start button, and unload the work at the end of the cycle.

Both the swiveling Type B Air-Tracer and the template rail are supported at the front of the bed. Hydraulic power is em-

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"Standard" Turks Heads (adjustable draw plates) draw rod accurately to triangular, rectangular and special shapes—both plain and ornamental. All four sides are rolled simultaneously. "Standard" Turks Heads, universal and plain types, are available in a wide range of capacities, with friction or power driven rolls, tandem mountings and special attachments. Widely used as running-in guide and sizing facility on pay-off side of rolling mills and wire flattening mills. Write for Bulletin TH.

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FROM COLD	1850° F. in 55-65 min.			1850° F. in 55-65 min.			2000° F. in 2½ hrs.		
AMPERES	14.8 at 230 v.			19.6 at 230 v.			20.2 at 230 v.		
WATTS	3400			4500			4650		
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PRICE	160.00	185.00	200.00	225.00	245.00	270.00	285.00	310.00	340.00

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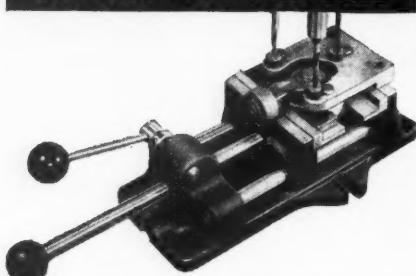
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You can stop the heavy expense and time losses common in the building of special jigs for drilling and light milling operations. Use the Heinrich "Grip-Master" as a base-structure. Built-in bosses and removable parallels permit easy attachment of bushing plates and locating jaws. You can speed up loading and unloading unbelievably, thanks to the large jaw openings of the "Grip-Master" and its revolutionary screwless feature.

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Ask your Mill Supply Dealer about the Heinrich "Grip-Master." If he does not yet have a stock, write for folder that fully illustrates and describes the money saving uses of this amazing tool.



HEINRICH
Grip-Master
DRILL PRESS TYPE
SCREWLESS VISE

**NATIONAL MACHINE TOOL CO.
DEPT. 117-M RACINE, WISCONSIN**

and indexing tables, cross slides, and hopper feeds may be combined with automatic cycling of the machine to provide for completely automatic operation.

The precision ground hardened tool steel lead screw operating in a bronze lead screw nut with 2 inches of full diameter thread contact is said to ensure enduring fidelity of thread form, even in Class 3 and 4 fits. The rigid precision machined heat treated alloy steel spindle mounted in Timken tapered roller bearings and the super-sensitive clutch, in combination with positive coolant control,

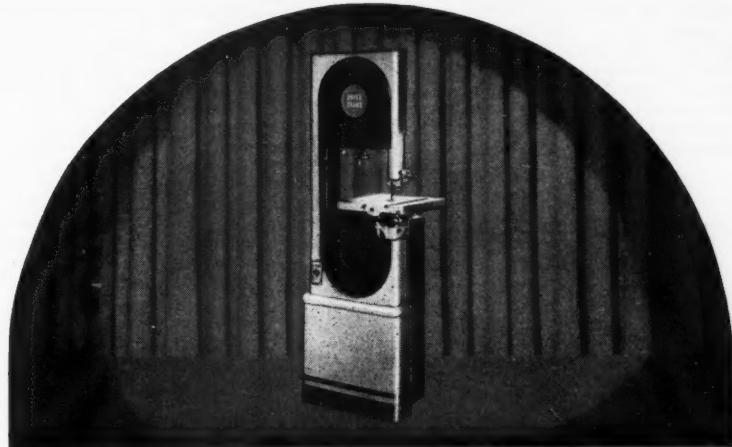


Cleveland Model E Tapping Machine

are claimed to eliminate tap breakage and greatly increase tap life. Tapping depth can be precisely controlled within 0.005 inch by means of a plainly marked dial on the side of the head, thus facilitating blind hole tapping. Spindle speeds can be readily changed by a simple belt change on multiple pulleys, and the operation of the machine may be fully automatic or manually controlled by means of a push button or foot switch.

Designed for maximum strength and rigidity, the machine has a heavy welded steel plate base and column and rigidly anchored adjustable work table, and is

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ntrol,



FOR SPEED AND ACCURACY
in cutting practically any material

BOICE - CRANE No. 2300 14" BAND SAW

Operates at higher speed—4,400 blade feet per minute. Smoother and faster cutting. Sturdy enough for foundries and production. Accuracy to spare for tool and die work, like contour sawed cams, dies, and punches; ideal for experimental laboratories and pattern shops.

Single and 8-speed back-gearied models for cutting practically any material. Clears 8 $\frac{1}{2}$ " under the guide.

One-piece welded steel frame has tremen-

dous strength. Wheels and blade, except at cutting point, are entirely enclosed. Cabinet type base has sealed-off motor compartment. High safety rating.

Blade guides adjust by a single control, and with full safety, even when machine is running. Close balance and light, but strong Textolite wheels permit twice the speed of other 14" machines. Less vibration, and longer bearing life. Saws wood two to four times faster. Often pays for itself in 3 to 6 months.

S P E C I F I C A T I O N S

Sawing Capacity: Blade to guard—13 $\frac{1}{4}$ ", 27" dia. work. Guide to work table—8 $\frac{1}{2}$ ". Table: Tilts on Double Trunnions. Size 15" x 15 $\frac{1}{2}$ ".

Height Overall of Floor Model: 67"

Blade Widths: 3/16", 1/4", 3/8", 1/2" and 3/4"

Length of Blade: 98"

Wheels: Disc. Moulded Textolite. 14" dia. 1" face

Bearings: Grease-sealed Ball Bearings.

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specify only the products of manufacturers who SPECIALIZE in producing power tools, rather than making them a sideline.

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SAW JOINTERS • THICKNESS PLANERS • TILTING ARBOR SAWS
SPINDLE SANDERS • SPINDLE SHAPERS • BAND SAWS

made in six sizes for tapping or threading either right or left-hand threads. All moving parts except the quill, spindle, and tap are fully enclosed for operator safety. All control switches are of the 110-volt type and fully protected, and the special high reversal tapping motor is designed to provide built-in protection against high temperatures.

Wilson Improved No. 512 Electrode

An improved No. 512 all-position mild steel electrode which is designed to produce weld metal possessing not only excellent mechanical properties but also low hydrogen content is announced by the Wilson Welder and Metals Co., Inc., Dept. 1543P, 60 E. 42nd St., New York 17, N. Y. According to the manufacturer, the improved electrode has two advantages over its predecessor in that it can be used on alternating and direct reverse polarity current with the operating characteristics being equal. The former 512 electrode could only be used on d.c. reverse. Secondly, preheating of the electrode is said to be no longer required to obtain por-

osity-free weld deposits that are obtainable by using either the stringer bead or the full weave technique.

Recommended applications for the Wilson Improved No. 512 Electrode include the welding of high sulphur free-machining steels; welding of hardenable steels where no preheat is used; welding of cold rolled steels; and weldments to be vitreous enameled after welding. The extremely low hydrogen content of the electrode is claimed to make possible the production of satisfactorily enameled surfaces without any heat treatment prior to enameling.

Lemert Double-End Airflex Riveter

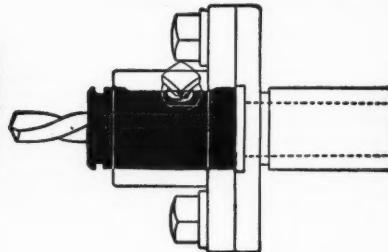
The Lemert Engineering Co., 1200 N. Western Ave., Plymouth, Ind., announces that the principle of "Rotating Impact" which has been effectively employed on its standard vertical type Airflex riveter has been applied to a horizontal double-end riveter. Originally designed to simultaneously rivet both ends of a door hanger axle as shown in the accompanying illustration, the double-end machine is adaptable to many other applications, in-



Now available for all types of tool holders and turrets. Tremendous gripping power prevents drill slippage—extreme accuracy and parallelism assured. Sold in sets or individually as low as \$1.25 each.

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Set No.	Holder Number	Bushing Size Dia.	Length	Range of Set in 64ths	No. of Pieces	Net Price with Case
SB-103	00 AC 10-A	1/2	3/4	1/16 to 5/16	17	\$20.00
SB-105	11A 20 BA	5/8	7/8	1/16 to 7/16	25	\$31.00
SB-106	12B-14 228	1	1 1/4	1/4 to 3/4	33	\$54.30

THE H. C. CLATFELTER COMPANY
FERNDALE 20, (DETROIT) MICHIGAN

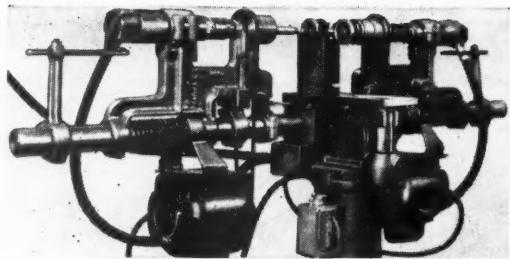


Send us your specifications and blueprints—We will see that your job is set up with the right LIVE CENTER.

STURDIMATIC

TOOL COMPANY

5222 THIRD AVE. DETROIT, MICH.



Lemert Double-End Airflex Riveter

cluding the double-end riveting of fuse box switch frame parts and the double-end riveting of toy train truck axles. According to the manufacturer, the machine is ideal for riveting the wheels on the axles of any wheeled toy, especially where the axle has a shoulder on each end; for simultaneously heading both ends of a tie rod; and other similar work.

The construction and operation of the machine are similar to the standard vertical type with the exception that two frames are mounted on a horizontal bar with cable and pulley arrangements which operate both hammers simultaneously when the foot pedal in the base is applied. The valves of the pneumatic

hammers are opened automatically as in the standard type. The gap between the frames is easily adjustable by simply removing the quick adjustment screw. For extremely wide adjustments, a longer cable is merely used. The work is held by a simple holding fixture that slides between the two riveting hammers. Four sizes of hammers are available which are easily interchangeable according to the type of work that is to be done.

The "Rotating Impact" principle employed by the machine combines precision controlled straight line pneumatic hammer blows with a fluted rotating peen. The peen strikes as it is rotated by an electric motor to form a full tight head in riveting metal or other materials with any type or length rivet. The fluted peen reduces the bending force of the blow to that which the rivet will withstand, thus making riveting possible in brittle material such as glass, plastics, fiber, and so on. Tight or loose joints can be made with equal precision.

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Adaptable to All Deep Drawing Press Operations



Cushion Size..... 5" 6" 8" 10" 12" 14" 16"

Maximum Draw..... 2" 2 1/2" 3" 3" 3" 4" 5"

Maximum Tonnage..... 9 1.4 2.5 3.9 5.7 7.7 10.0

A cushion model and size for every press requirement.

Die cushions with hardened and ground pin pressure pad which can be used to an advantage on all pressure pad controls on a large percentage of your forming dies.

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CULLMAN *Stock* *Design* SPROCKETS

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With many types to select from—you are almost certain to find just the size you need for practically every transmission requirement—ready for immediate delivery. Cullman Sprockets—produced by fast, low-cost, high-precision methods—assure top operating efficiency. "Specials," too, are quickly available—made up by exclusive Cullman methods and specialized equipment.

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Vac-It is easy to use and simple to handle, requiring a minimum of time and labor. Engineered cleaning attachments do the reaching and stooping for you.



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DOYLE VACUUM CLEANER COMPANY
3225 Stevens St., S.W., Grand Rapids 7, Mich.

Bradford Series "190" Grinders and Buffers

The Bradford Machine Tool Co., Cincinnati, Ohio, announces the production of a line of bench and pedestal type grinders and buffer-polishers equipped with 1 h.p. 110-220-volt 50/60-cycle single-phase motors. Designated as the Series "190," the machines are designed to meet job requirements of small shops, maintenance departments, garages, farms, and hobby shops having single-phase electric power supplies.

The Series 190 machines comprise 11 models. The Model 190 is a double-wheel pedestal grinder; the Model 191 (illustra-

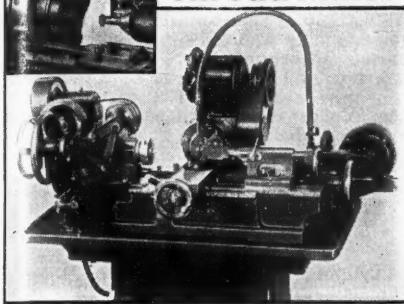


Bradford Model 191 Combination Grinder
and Buffer

ted herewith) is a combination grinder and buffer with pedestal mount. Both models have a wheel diameter of 12 inches. One fine and one coarse grinding wheel are supplied with the Model 190 grinder and one fine grinding wheel with the Model 191. Standard equipment for each model includes safety glass eye shields, spark breakers, tool tray, and water pot. The spindles are of chrome-nickel steel and are mounted on ball bearings. The wheel guards are adjusted radially and are equipped with hinged doors which provide for quick wheel change. The Models 190 and 191 can be obtained



WALTHAM Thread Miller



For threading small parts. It will cut V, N.S., Acme, Whitworth and Metric threads, special threads. Special head for internal threading is shown in insert at left. Special head for relieving can also be furnished. Send us drawings or samples and we will gladly submit our suggestions, no obligation. Also makers of Small Milling Cutters, Sub Presses, Pinion and Gear Cutting Machines.

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Hammond
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5000 MACHINERY BUILDERS

FINISHING PRODUCTION
REACHES A NEW PEAK

HAMMOND
BACKSTANDS
CONVERT GRINDERS and POLISHERS
into high production
ABRASIVE BELT UNITS

MODEL No. 3

Above: "VRO" Polishing Lathe with two No. 3 Backstands.

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CATALOG NO. 55**
—covering complete line
of Hammond equipment.

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SPRING PRESSES

POWER AND FOOT OPERATED

For riveting, staking, stamping and similar operations on small light parts. Constructed to compensate for variation in thickness of the work and to deliver a **UNIFORM BLOW AT EVERY STROKE**.



M-110 (illustrated) motor driven to eliminate fatigue factor of foot operated press—similar press M-130, equipped to operate by compressed air.

OTHER T & F MACHINES

Duplex Spline Millers — Medium Duty and High Speed Sensitive Drilling Machines.

Send for Bulletin



EST. 1834

THE TAYLOR & FENN CO. HARTFORD 1, CONN.

with bench type bases, in which case they are listed as the Models 190B and 191B.

Seven buffers are included in the 190 Series. The Model 192 is a two-ball bearing pedestal buffer having a 23½-inch distance between wheels. The Model 193 is a four-ball bearing pedestal having a 31-inch distance between wheels. The Model 194 is a four-ball bearing pedestal buffer of the wide housing type and having a 39-inch distance between wheels. Each of these models is available in a bench style, if desired. The Model 195 is a low-stand four-ball bearing buffer hav-

ing a 31-inch distance between wheels and a height of 37 inches from the floor to the center line of the spindle. The splines on all buffer models are chrome-nickel steel.

The motors used on the Bradford Series 190 Grinders and Buffers are totally enclosed according to N. E. M. A. specifications and are equipped with push-button type switches. The machines are sturdily constructed to provide for long, accurate operation.

Accurate Hole Transfer Made Easy With **NIELSEN TRANSFER SCREWS**



Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. 7 sizes U.S.S. Inexpensive — Last for years. Write for Circular.

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Rod Grinding



STRAIGHT RODS

1/32" to 1/2" Diameter

Diam. Tol. .0005" on Rods Up to 6' Long.
Diam. Tol. .001" on Rods Up to 12' Long.

Quick Delivery

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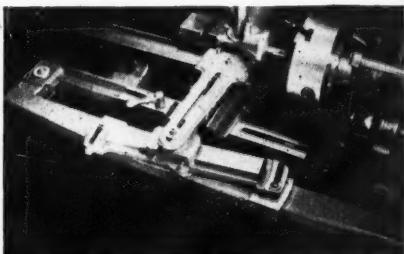
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**COMMERCIAL
CENTERLESS
GRINDING CO.**

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Master Heavy Duty Taper Attachment

Available in two sizes with 34 or 40 inches between arms, a heavy duty taper attachment for lathes having vee or flat



Master Heavy Duty Taper Attachment Installed
on a Lathe

ways has been announced by the Master Taper Co., 126 N. Clinton St., Chicago 6, Illinois.

The attachment, which can be furnished for all lathes with a 13 to 26-inch swing, is of all-steel construction with ample strength for heavy duty service.

For
Fast, Accurate
Metal-Cutting
Use



KENNAMETAL CEMENTED
TOOLS, BLANKS, and MILLING CUTTERS



KENNAMETAL Inc.

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THE GRANT MFG. & MACHINE CO.
96 Silliman Ave. Bridgeport 5, Conn.

Quick Acting JOHNSON FURNACES

JOHNSON Hi-Speed No. 120 Bench Furnace

- 1500° F. IN 5 MINUTES
- 2300° F. IN 30 MINUTES
- HARDENS ANY STEELS
- BRAZES CARBIDE TIPPED TOOLS



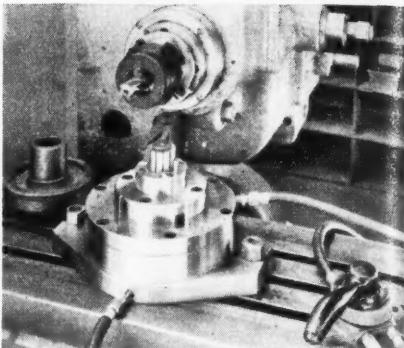
Designed primarily for heat treating high speed steels, this wide-range Quick Acting Johnson Furnace is equally efficient for hardening high carbon steels, tools, dies and small metal parts. Easily regulated with accuracy. Heats up FAST to save time and gas. Firebox $5 \times 7\frac{3}{4} \times 13\frac{1}{2}$. Complete with Carbofrax Hearth, G.E. Motor, and Johnson Blower.

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TODAY!** **\$120.50**
F.O.B. Factory

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JOHNSON GAS APPLIANCE CO.
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The attachment has a capacity for turning tapers up to 4 inches per foot, 20 deg. maximum in either direction, and 16 inches in length at one setting. The swivel bar has V-ways, with one end of the bar graduated in degrees and the other end in inches per foot. The sliding fixture has a long bearing on the swivel bar, with gibbs to compensate for continuous usage. The slotted overarm is attached to the cross slide as shown in the accompanying illustration, or with an (finished) adjustable bar.

To install the Master Heavy Duty Taper Attachment, two holes are simply drilled and tapped in the cross slide of the lathe and the feed nut disengaged.

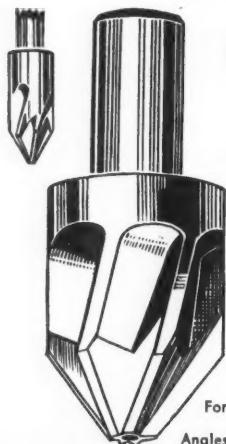


Erickson Special Work-Holding Air-Operated Fixture

In order to obtain the most from a standard Erickson precision chuck mounted on a milling machine, particularly in terms of accuracy, Erickson Tools Division, 2309 Hamilton Ave., Cleveland, Ohio, has designed a special work-holding air-operated fixture incorporating a precision faceplate mandrel. The fixture is equipped with special locators for posi-

Erickson Special Work-Holding Air-Operated Fixture

tioning the work part so as to hold it absolutely square and concentric to the spindle. The pieces are located at a constant height and always in the exact position desired in relation to the reference point on the work, it is claimed. The air feature of the fixture enables workpieces to be mounted in a minimum of time and



CHATTERLESS COUNTERSINKS

HIGH SPEED STEEL AND CARBIDE

HEAVY DUTY

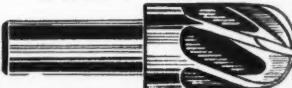
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CHATTERLESS BALL SEAT REAMERS

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For use in Drill Presses, Turret Lathes
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Angles 30°, 41°, 45° Stocked in 12 Standard
Sizes, High Speed Steel and Carbide

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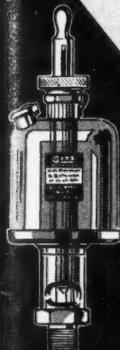
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Gits Gravity Feed Oiler controls oil flow by simple turning of a knurled screw. Flow can be shut off completely during idle periods. The transparent reservoir shows quantity of oil present, and rate of flow may be viewed at all times through a sight glass in the shank. Available in several models, Gits Gravity Feed Oilers are especially adapted to high vibration operations. Sizes, models, prices on request.

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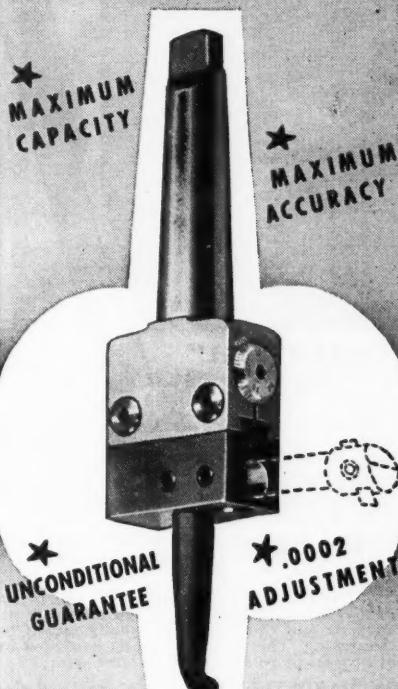
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The **MAXWELL** Precision Boring Head



3 sizes from \$44.00 to \$105.00. Boring capacity $\frac{3}{8}$ " to 15". Available with any standard shank. Immediate delivery from stock. Circular upon request.

THE MAXWELL CO.

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"HARDSTEEL" DRILL

• When last minute changes come through on hardened parts and dies—drill without annealing using "HARDSTEEL" drills—and save time.

When parts must positively match at assembly—harden first, then drill with "HARDSTEEL" drills—and save time.

When case hardened steels must be drilled, use "HARDSTEEL" drills to get through the case—and save time.

Yes, "HARDSTEEL" drills, made of special material and to a special design eliminate all annealing and the distortion usually caused by rehardening. They work on steels hardened by any process to 40 Rockwell "C" or harder.

The "HARDSTEEL" Operators Manual will give you many tips on how this well known tool can save time and material in your plant. Copy free on request.

You Harden It — We'll Drill It —
with "HARDSTEEL"

"HARDSTEEL" Tool bits make
faster, deeper cuts on steels
and non-ferrous alloys.

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DRILLS • TOOL BITS • SPECIALS

removed with a minimum of effort.

The Erickson Special Work-Holding Air-Operated Fixture utilizes interchangeable sleeves and is designed to accommodate three additional sizes of mandrels, thus permitting a wide variety of work-pieces to be handled.

Peerless 20-Inch Horizontal Belt Surfacing Machine

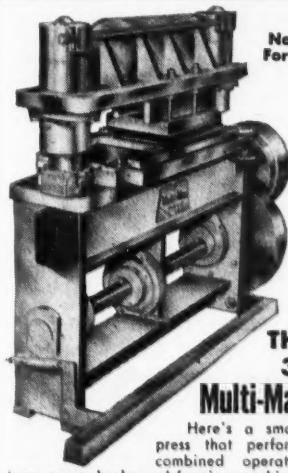
A 20-inch horizontal belt surfacing machine which can be used wet or dry for the flat surfacing of die castings, plastics, cast iron, steel, alloys, ceramics, and other materials is now being marketed under the trade name of Peerless by the



Peerless 20-Inch Horizontal Belt Surfacing Machine

Production Machine Co., Greenfield, Mass. The machine utilizes waterproof bonded abrasive belts 20 inches wide x 12 feet 6 inches in circumference which are available in a full range of grits from 24 (coarse) through 500 (fine). The unit has a standard belt surface speed of 4,600 f.p.m., with optional speeds available on order.

The work table of the Peerless 20-Inch Belt Surfacer has an available working area of 20 x 30 inches to allow for oscillation of large as well as small parts. A work stop with adjustments for handling all types of parts is provided. The carefully balanced aluminum pulleys of the machine each have a 15 1/4-inch O. D. x 20 1/4-inch face and are processed to eliminate belt slippage. The drive and idler shafts are mounted on ball bearings which are sealed to prevent the entrance

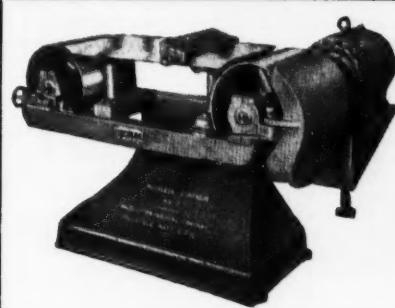


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Here's a small versatile press that performs all the combined operations of a shear, press, brake and forming machine. It may be picked up and moved in and out of the production line as needed. Finished parts are fabricated right at the point of assembly. Saves handling, stacking and storage costs. Write for specifications and prices.

PARKER MANUFACTURING CO.
2200 Colorado Ave., Santa Monica 5, Calif.



PEERLESS ABRASIVE BELT SURFACER

Speed and quality in grinding flat surfaces of metal, wood, hard rubber, celluloid and plastics. Obtainable in both vertical and horizontal types—9", 14", 20" sizes.

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Dependable MEASURING & CHECKING EQUIPMENT

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UNIVERSAL ANGLES
In 10 sizes, ranging from
4 x 3½ x 3 and up.

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In 12 sizes, ranging from
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In 10 sizes, ranging from
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SURFACE PLATES
Over 20 sizes, ranging from
7 x 7½ in. to 5 x 11½ in.
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MACHINE PRODUCTS CORPORATION

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of coolant. Abrasive belts can be tightened by a ratchet lever and tracked by a handwheel located in a convenient position outside of the housing at the left side of the machine.

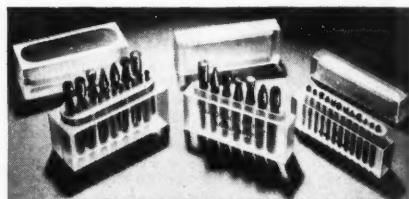
The recirculating system of the machine comprises a centrifugal coolant pump mounted in a tank having a 32-gallon capacity and a baffle plate which is readily accessible for cleaning. The main drive motor of the machine is a 10 h.p., 220, 440, or 550-volt, 3-phase 60-cycle, 1,200 r.p.m. unit with a magnetic starter and push-button control. A $\frac{1}{4}$ h.p. pump motor with separate magnetic starter and

push-button control is also furnished as standard equipment.

The Peerless 20-Inch Horizontal Belt Surfacing Machine occupies a floor space of $61\frac{1}{4} \times 86\frac{3}{8}$ inches, including tank, motor, and guards. The unit has a net weight of 2,600 lb. and a shipping weight of approximately 3,000 lb. The machine is also available in a 14-inch size.

Lincoln Park Carbur Sets

Lincoln Park Industries, Inc., 1719 Ferris Ave., Lincoln Park 25, Mich., announces the addition of two new standard sets to its line of Carbur sets, thus



Lincoln Park Carbur Sets

ACE
DRILL JIG BUSHINGS
A.S.A. STANDARD
Immediate Delivery
on standard sizes
Fast service on specials
(Write for Catalog and Discount Sheet)
WEST COAST AERO TOOL CO.
5401 Fountain Ave. Hollywood 27, Calif.

TYPE HOLDERS AND TYPE . . . ROLL MARKERS . . .
HAND STAMPS LOGOTYPES DIES STANDARD
AND SPECIAL STAMPS INSPECTORS STAMPS . . .
MACHINE ENGRAVING PRECISION DUPLICATING

NEW METHOD STEEL STAMPS, Inc.
149 Joseph Campau, Detroit 7, U.S.A.

making a total of three such sets now supplied by the company. Each set of tools is contained in a handy plastic case.

One of the sets is comprised of seven different tools of $\frac{1}{4}$ -inch head diameter and with shanks $\frac{1}{4}$ inch in diameter $\times 1\frac{1}{4}$ inches long. The other set combines the seven $\frac{1}{4}$ -inch diameter tools with the standard set of 11 Midget Carbures which have $\frac{1}{8}$ -inch head diameters and are $1\frac{1}{8}$ inches long overall with $\frac{1}{8}$ inch diameter shanks.

The Carbures are made of solid cemented carbide and are said to efficient-

ADVANCE CLAMPS

Cut Set-Up Time 75 %

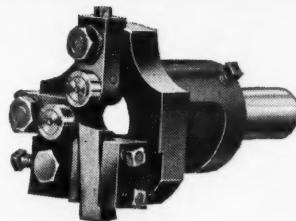
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For use on all machines with T-slots.
Manufactured and sold by

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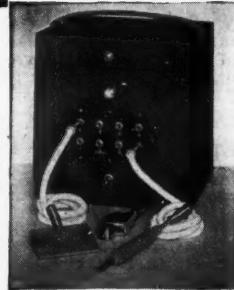
WATSON **Tangent Cut Box Tool**



A general purpose, tangent cut, roller rest box tool of wide range for turning diameters from bar stock, castings, forgings or other material. Applicable to all sorts of screw, turret and other machines, hand or automatic. It is simple to set and eliminates resetting when it is necessary to grind the bit. Write for descriptive folder giving complete information.

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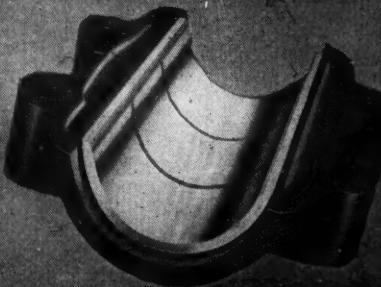
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ly cut practically any material, including hardened steel. The tools may be operated at unusually high speeds and are claimed to hold their form.

"The Ram" Model 640 Heavy Duty Plunger Clamp

The Detroit Stamping Co., Dept. K., 349 Midland Ave., Detroit 3, Mich., is now producing an extra heavy duty plunger clamp designated as "The Ram" Model 640. Capable of exerting over 2,500 lb. normal pressure, the clamp is so designed that the handle is down when the unit is closed, thus making it particularly useful on machines or fixtures where space is restricted. Moreover, the operating motion is downward and away from the work; the heavily loaded handle provides for split-second closing since the mere tipping of the lever closes the clamp with considerable pressure.

According to the manufacturer, The Ram Model 640 Plunger Clamp is readily adaptable to such conversions as light arbor, punch, and forming presses; for alignment of wood or metal parts in large fixtures; or for heavy duty clamping of parts for milling, drilling, cementing,



"The Ram" Model 640 Heavy Duty Plunger Clamp

welding, or other production operations. The unit measures 15 $\frac{1}{4}$ inches long overall x 3 $\frac{1}{4}$ inches high when closed. The plunger travel is 1 $\frac{1}{4}$ inches, and the pressure may be adjusted by turning a $\frac{5}{8}$ -inch bolt in the tapped end of the plunger. The base of the clamp is a rugged casting with bronze plunger bushing. The toggle link is of hardened steel, and the pins are drill rod.

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Ansaldi Automatic Disintegrator

An automatic disintegrator that is designed to remove broken taps, drills, studs, reamers, and so on, from die sections, castings, hardened steel, brass, bronze, and most any alloy without distortion or heating of the casting of the machine part is announced by the Ansaldi Tool & Engineering Co., 4744 12th St., Detroit 8, Mich. Electrodes are used as the means for removing the obstructions and, once adjusted in position, the disintegrator is said to complete the broken tool re-



Ansaldi Automatic Disintegrator

moving operation without any further attention.

According to the manufacturer, broken No. 2 taps up to 1 inch in diameter can be easily removed with the Ansaldi Automatic Disintegrator, with an ordinary $\frac{1}{2}$ -inch tap disintegrated within 7 or 8 minutes. Electrodes, several feet in length, are available for deep holes. The disintegrator includes a revolving head which can be swiveled to any angle or compound angle and may be used horizontally, upside down, to a height of 7 feet or close to the floor. The extended arm has a radius of 4 feet.

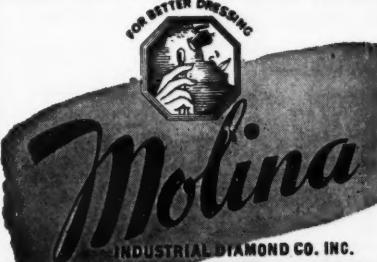
The standard unit is equipped with casters for easy moving about the shop but can also be supplied in a model for use

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Our No. 703X—Three layers containing a total of 20 diamonds. Multiplicity of cutting points; depending on diameter of wheel, four or more diamonds will always contact the wheel, giving finer dressing and precision finish. Recommended in all straight-faced dressing and truing on wide-faced, hard silicon carbide wheels. Used most effectively on Norton Cylindrical, Landis Cylindrical, Cincinnati Cylindrical Grinder and (with special Adapter) on Cincinnati Centerless Grinder.

Requires fewer passes across the wheel. Generally used with fast dressing traverse.



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lawn Ave.
Cleveland—John P. Roberts, 501 Perry Payne
Bldg.
South Bend—Formrite Tool Co., 1311 W. In-
diana Ave.
Toledo—W. C. Sorgen Co., Box 207, Sta. B.
Moline—L. R. Christiansen
Co., 309½ 16th Street.
Milwaukee—Redi Products
Co., 211 South 2nd St.



"There is no economic
substitute for diamonds."

on the bench. Moreover, a portable type disintegrator adaptable to drill press operation can be furnished. The table on the standard machine is provided with $\frac{3}{8}$ -inch screw holes for positioning or holding devices and workpieces. The disintegrator includes an automatic feed and control for 24-hour operation without overheating. The control panel is equipped with a voltmeter, control knobs, and water valves.

Electronic Automatic Sizing Control for Micromatic Microhoning Machine

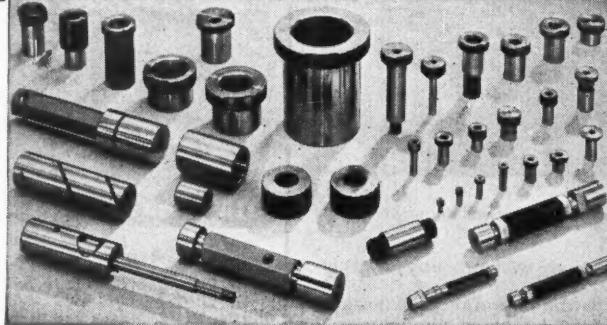
The Micromatic Hone Corp., 8100 Schoolcraft Ave., Detroit, Mich., announces that its Microhoning Machine is now available with an electronic automatic sizing control (Microsize) which, when the bore is honed "to size," takes over the control of the machine and directs it through the proper sequence of operations to end the cycle. The control contains two Thyratron electronic tubes. The trigger tube picks up the "to size" impulse, while the timer tube controls the runout. With the control, bore-to-

bore size can be held to 0.0003 inch or less in production, it is claimed.

Combined with multiple spindle machines equipped with automatic rotary indexing fixtures, Microsizing has made it possible to Microhone progressively. With this new type of equipment, stock is removed in successive steps. The abrasive is varied to suit the position of the bore at each spindle and to produce the finish desired. As much as 0.008 to 0.012 inch of stock per minute may be removed by the machine from hard steel parts.

The Microsize control consists of three parts; namely, (1) a gage ring, (2) a Micromold tool in which the abrasive sticks are mounted in plastic holders, and (3) an electrical control circuit, as shown in Fig. 1. The gage ring contains a carbide insert having an inside diameter equal to the low limit of the desired bore size. This ring is so located that only the plastic tabs on the upper ends of the plastic stoneholders can enter it at the top of each stroke. The plastic tabs wear with the abrasive; therefore, the outer diameter of each tab, around the periphery of the tool, is said to be always equal to the diameter of the bore being Microhoned. When the bore is "to size," friction between the gage ring and the plas-

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A.S.A. STANDARD types and sizes in stock for immediate delivery. Excellent delivery on NEW GAGES and GAGES salvaged by HARD CHROMIUM PLATING.

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tip tabs causes the gage ring to rotate slightly.

To end the Microhoning cycle, spools in the hydraulic circuit are shifted by solenoids. The actuation of the solenoids is controlled by relays. The electronic circuit is the link between the gage ring and the relays.

When the "to size" impulse rotates the gage ring, the grid of the trigger tube is grounded, as shown in Fig. 2, thus removing the blocking potential on the grid and thereby allowing the tube to fire.

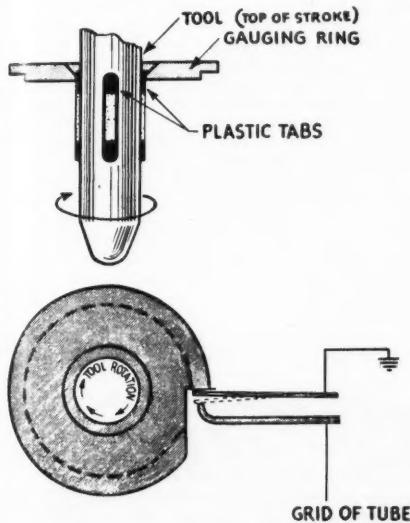


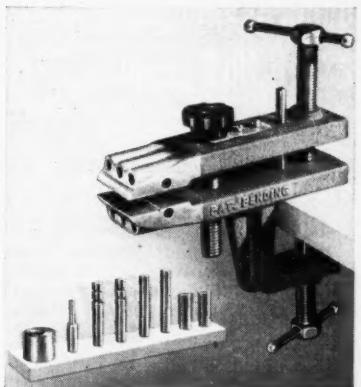
Fig. 1—Diagram showing component parts of Microsize electronic automatic sizing control

With the flow of electrons no longer blocked, Relay ER is energized, closing the ER contacts. One contact energizes a solenoid that shifts a spool, thereby stopping the expansion of the tool. The other contact grounds the cathode of the timer tube. Unlike the trigger tube, the timer tube does not fire immediately. There is a preadjusted delay governed by a "charge" stored on the 1 MFD condenser. The condenser loses its charge through the 5-megohm resistor so that the grid of the timer tube no longer blocks the flow of electrons and the tube fires. Relay TD is picked up, thereby energizing a solenoid that shifts a spool and causes the collapse and withdrawal of the tool from the bore.

BENCH KING

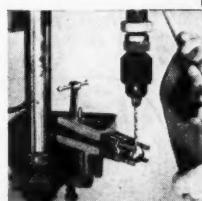
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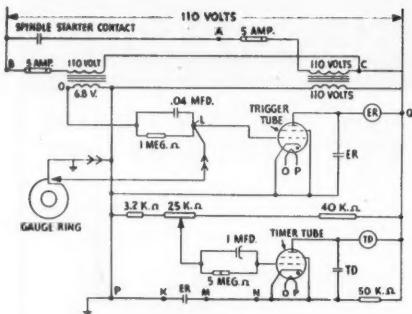


Fig. 2—Diagram showing operating function of Microsize control

The length of delay in the firing of the timer tube (the runout period) is controlled by the magnitude or "charge" on the condenser. This charge is governed by a variable 25 kilohm potentiometer.

Johnson 90-Ton Inclinable Press

The Johnson Machine and Press Corp., Elkhart, Ind., is now producing an inclinable power press of 90-ton capacity which may be used in the horizontal po-

sition or can be easily tilted back at a 25-deg. angle so that the work will drop away from the press without the use of an ejector. The press is designed to handle work up to 15 inches in depth and has a production rate of 44 pieces per minute.

The construction of the Johnson 90-Ton Inclinable Power Press includes an extra thick bolster plate which is said to provide extra strength for heavy operations without reducing the die space. An interchangeable thick steel bolster is available to provide greater than normal die space for a press of this size without sacrificing strength. A patented tripping device is provided to protect the operator in the event of spring breakage. If one of the two activating springs breaks, the other spring actuates the trip. If both springs should break, the clutch is arranged to automatically disengage. Springs can be easily replaced without stopping the machine.

A friction type brake is located within easy reach of the operator, with the brake being quickly and easily adjusted by turning a small knob. The flywheel of the press is of solid web, breakage-proof construction, machined for smooth performance, and is equipped with anti-friction tapered roller bearings.

The capacity of the press at the bottom of the stroke is 90 tons. The crankshaft

has a $5\frac{1}{8}$ -inch main bearing, a $6\frac{1}{2}$ -inch crank at the pin, and a standard stroke of 4 inches. A crankshaft with a special stroke of 9 inches can be obtained on order.

The distance from the top of the bolster front to back is 28 inches and from the top of the bolster right to left is $40\frac{1}{2}$ inches. The bolster thickness is 4 inches, and the distance from the top of the bolster to the slide (stroke down, adjustment up) is 17 inches. The depth of the throat from ram center to the frame is 15 inches, and the distance from the bed



Johnson 90-Ton Inclinable Power Press

to the slide (stroke down, adjustment up—standard stroke) is 21 inches. The speed of the backshaft is 250 r.p.m. A $7\frac{1}{2}$ h.p. motor operating at 1,800 r.p.m. is used to power the press, which weighs approximately 17,000 lb. complete without skids.

Standard Type R2V Infinitely Variable Speed Buffing and Polishing Machine

The Standard Electrical Tool Co., 2518 River Rd., Cincinnati 4, Ohio, announces that its Type R2V infinitely variable

You'll Save
30%* or more by
using only Genuine
Clipper Belt Hooks
with *modern*
Clipper Belt Lacers

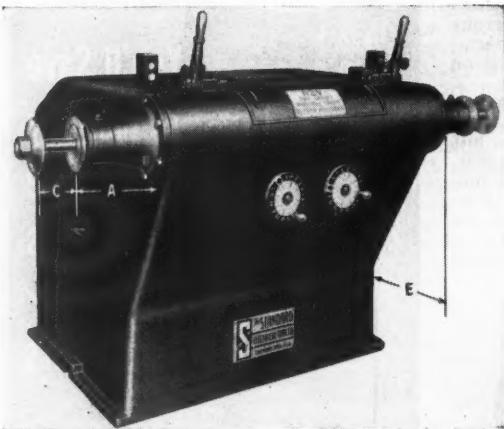
TIMKEN ROLLER BEARING CO. AND OTHERS
EFFECT THIS SAVING IN BELT LACING LOST

No. 9
Portable Lacer

In over 30 years experience manufacturing belt lacing equipment exclusively, Clipper has developed the world's finest belt hooks. To get the best service from these top quality hooks apply them with a modern belt lacer such as the Clipper No. 9 Portable. This combination will save you money. See your Mill Supply Jobber for demonstration.

CLIPPER BELT LACER COMPANY, Grand Rapids 2, Michigan





Standard Type R2V Infinitely Variable Speed Buffing and Polishing Machine

speed buffing and polishing machine formerly confined to two 5 h.p. or two 7½ h.p. motors is available with two 3 h.p. or two 10 h.p. motors. Each side of the Type R2V has its own spindle which is individually operated, thus permitting each workman to be independent of the

other. The equipment on each side of the machine consists of a ball bearing motor, magnetic starter, push - button station, hand brake with coincidental switch for stopping the spindle and shutting off the current, and two "Speedial" controls.

Compactly constructed, the machine includes a base measuring 32 x 30 inches. The "E" dimension shown in the accompanying illustration provides for a 13-inch overhanging type of base. Turning of the Speedial control provides for instant changing of the spindle speed, speed changes being simultaneously recorded on the dial. The machine has a speed range of from 1,500 to 3,000 r.p.m., with the correct speed being instantly available for buffing, polishing, coloring, and other operations. Thus, a uniform finish can be readily maintained throughout wheel life.

DORMAN FRICTION TAPPER with AUTOMATIC REVERSE

Capacity in steel: No.1 size— $2/56$ to $\frac{3}{8}$ ".

You don't need two or three different size tappers to handle a wide range of tapping. Nor do you need to hunt for collets to hold different size taps. By tightening one chuck screw of self centering, full floating chuck jaw the No. 1 will drive the above range of taps.

Attaches to all male spindle drills including Walker-Turner, Atlas, Buffalo Forge, Boice Crane, Canedy-Otto, etc., and to Morse Taper Drill Presses.

Also available in two larger sizes to take taps up to $1\frac{1}{4}$ " in steel or other tapable material.

Round Split, Button or Acorn Die Holder Assemblies in stock for all size Dorman Tappers permitting their use for external threading.

Write for Die Holder Bulletin

DORMAN MACHINE TOOL WORKS 36 S. Mac Questen Parkway, Mount Vernon, N. Y.



Ajax-Northrup 20 Kw. High Frequency Converter

Featuring extremely simple controls, safety interlocks, and a streamline housing, a 20 kw. self-tuning high frequency converter for induction heating and melting has been added to the line of Ajax-Northrup products offered by the Ajax Electrothermic Corp., Ajax Park, Trenton 5, N. J. The converter is designed to completely enclose all parts in one compact, semi-portable unit which measures 44 x 44 x 58 inches in size.

According to the manufacturer, only one conveniently located control knob is required to adjust the converter to the proper power output when connected to an Ajax-Northrup Metallurgical furnace or heating coil. The electrical circuit of the converter is self-tuning, with frequencies varying from 20,000 to 80,000 cycles per minute, depending upon the size and shape of the furnace coil to which it is connected. A watt meter and starting push button are also conveniently mounted on the front of the housing.

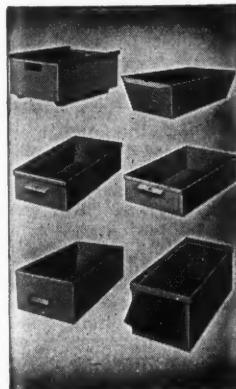
Of the spark-gap type, the Ajax-Northrup 20 Kw. Converter includes specially tipped copper electrodes in the hydrogen-atmosphere water-cooled spark gap chamber. To safeguard against damage



Ajax-Northrup 20 Kw. High Frequency Converter with 17-lb. Induction Melting Furnace

to the capacitor, spark gap, or furnace coils, an interlocked alarm bell rings if the converter is turned on when the cooling water is not flowing properly.

The converter is claimed to be ideal for melting up to 30 lb. of steel, for melting

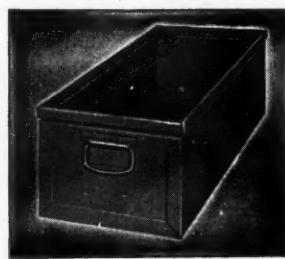


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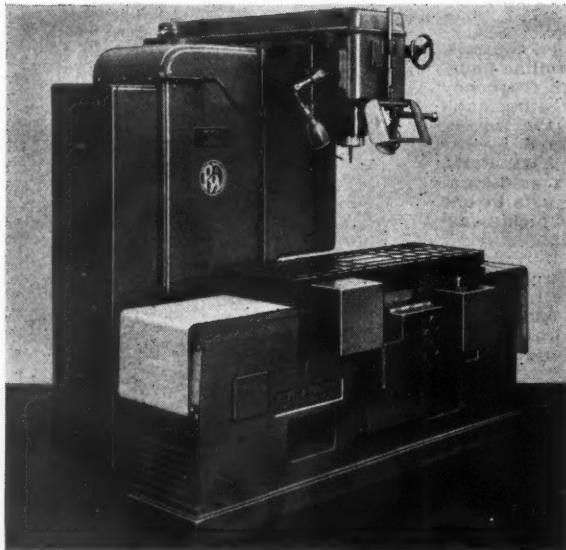


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We make a specialty of boxes made to fit your particular handling requirements. Special boxes designed so they can be run thru with standards enable us to quote prices comparable with that of a standard box.

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Pratt & Whitney No. 4D Die Sinker

up to 60 lb. of brass and bronze alloys, and for melting gold, silver, platinum, and other precious metals. Heating applications include such jobs as brazing, hardening, soldering, and so on. The unit is said to be capable of sustained operation at its 20 kw. rating, and, under favorable conditions, somewhat more power can be drawn, it is claimed.

Pratt & Whitney No. 4D Die Sinker

Especially designed to provide for the accurate, fast, and economical production of original forging dies, die-casting dies, molds, and similar work, the Pratt & Whitney No. 4D Die Sinker illustrated

herewith, has been developed by Pratt & Whitney, Division Niles - Bement - Pond Co., West Hartford 1, Conn. All machine motions are power operated, with speeds and feeds infinitely variable, but with all motions under effortless pilot hand controls.

The three fundamental machine motions necessary for die sinking are provided through a longitudinally moving horizontal work table of fixed height, and a vertical slide carrying a transverse (cutting spindle) slide. Movements of these slides, always made under power, are

governed by the new Pratt & Whitney "Directron" control which permits compounding any two components of travel. The Directron control is a single-lever device which, by unique electrical means, controls automatic continuous compound movements in any direction in either a horizontal or vertical plane. With the device, the layout lines on a die surface are followed exactly under effortless pilot hand control, it is claimed.

For the machining of certain impressions having one or more areas of constant cross section, templates representing the various longitudinal or transverse cross sections are mounted on the machine, and these are traced in their respective planes by an electric follower

S & S HINGES
VARIOUS WIDTHS
and GAUGES

BUTTS AND CONTINUOUS LENGTHS

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4533 W. LAKE STREET HARDWARE DIVISION CHICAGO, ILLINOIS

For
**GUARDS
CABINETS
CASES
BOXES**

which controls the corresponding machine motions automatically and with extreme accuracy. For other cavities which cannot be produced conveniently by either the Directron (pilot hand control) alone or by the use of cross section templates, a model table is furnished and such cavities can be machined from models with the aid of the electric follower used in conjunction with the Directron control lever.

All controls are concentrated at the front of the machine for maximum operating convenience. Longitudinal, transverse, and vertical feed rates are infinitely variable, and rapid traverse movements are provided. Spindle speeds are also variable between 35 and 1,750 r.p.m. The spindle itself has a ball-bearing collet closer of the wrenchless type to facilitate cutter change.

The P & W No. 4 D Die Sinker is designed to operate on standard a.c. voltages with the necessary d.c. provided by rectifier equipment furnished. Approximately 4 $\frac{1}{2}$ h.p. is required. The machine weighs approximately 10,000 lb. and is approximately 80 inches wide x 72 inches deep x 83 inches high. The distance from the floor to the top of the table is 34 inches and from the table surface to the end of the collet, 12 inches minimum and 28 inches maximum.

Duro Improved Heavy Duty Grinder

High speed, smooth, vibrationless operation and ample power for a wide variety of jobs are some of the features claimed for the improved heavy duty grinder now being marketed by the Duro Metal Products Co., 2651 N. Kildare Ave., Chicago 39, Ill. Streamlined to fit the operator's hand, the tool is ruggedly constructed and is powered by a universal motor that is designed to develop 42 watts output at approximately 20,000 revolutions per minute.



Duro Improved Heavy Duty Grinder

The Duro Improved Heavy Duty Grinder can be operated on 60 cycles or less, alternating or direct current. The spindle revolves on sealed precision ball bearings that take up all thrust and radial loads. A propeller-type fan draws a large volume of air over the motor, thereby keeping vital working parts cool at all times.

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Needless blade breakage stops. More materials can be cut! Production increases! Safer for workmen! Interchangeable ball-bearing wheels, running with the blade, give strong, friction-free support to the working portion of the blade. Makes old band-saws work better—makes new band-saws more efficient! Write for details—or mail your order for TEN DAYS FREE TRIAL.

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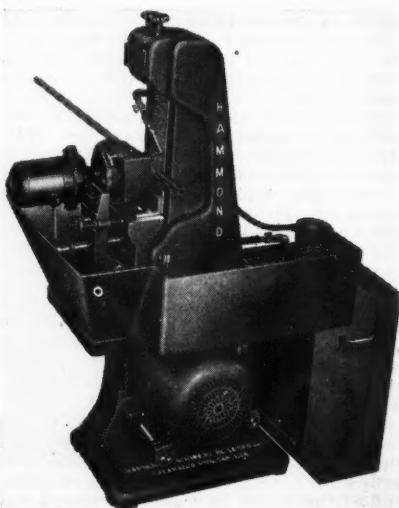


speeds. The specially designed threaded type collet chuck is constructed to overhang the housing only $\frac{1}{8}$ inch, thus readily adapting the tool to delicate, precision work. Two collets, one for $\frac{1}{2}$ -inch shanks and one for $\frac{1}{4}$ -inch shanks, are included with the grinder, which is standardly furnished for operation on 110 volts, with models for operation on 220 volts available on order.

Hammond Model OD-1 Cylindrical Grinding and Polishing Machine

Hammond Machinery Builders, Inc., 1615 Douglas Ave., Kalamazoo 54, Mich., announces the addition to its line of grinding and polishing equipment of the Hammond Model OD-1 Cylindrical Grinding and Polishing Machine shown herewith, which is designed for rods, bars, and tubes $\frac{1}{8}$ to $1\frac{1}{4}$ inches in diameter. The Model OD-1 is a centerless machine using coated abrasive belts for grinding and polishing. According to the manufacturer, the unit is designed to remove up to 0.005 inch per pass on ferrous metal parts and up to 0.010 inch on non-ferrous products. Work supports are constructed to handle

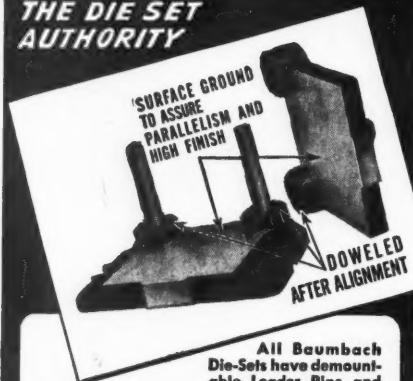
$\frac{1}{2}$ -inch bars up to 18 feet long and 1-inch bars up to 8 feet long. The accuracy on production items is claimed to be 0.001 inch, with closer limits on some work.



Hammond Model OD-1 Cylindrical Grinding and Polishing Machine

BAUMBACH

THE DIE SET AUTHORITY



All Baumbach
Die-Sets have demountable
Leader Pins and
Bushings. This exclusive feature permits re-
moving Leader pins for machine work on the
die shoe and assures reassembly without loss
of alignment. A big time and trouble saver.
Write for Catalog.

E. A. BAUMBACH MFG. CO.
1806 S. KILBOURN AVE. CHICAGO 23, ILL.

The endless abrasive belt employed on the machine is 4 inches wide x 60 inches long and may be operated dry or wet with coolant. Two methods of feeding are employed; namely, through-feed and in-feed. The through-feed method is generally used and is performed by swinging the regulating wheel on its horizontal axis from 0 to 12 deg. The feed can be varied from 0 to 18 feet per minute.

O'Connor Electronic Handyman

A photoelectric control device designated as the O'Connor Electronic Handyman has been developed by John T. O'Connor & Co., 229 S. Valley Rd., West Orange, N. J. The device is of universal design and can be plugged into any convenient outlet. Said to be unusually easy to install and operate, the device is constructed to accommodate the plug of the item to be controlled at either of its normally open or normally off receptacles.

Features of the O'Connor Electronic Handyman include a unique combination layout and special circuits, working on

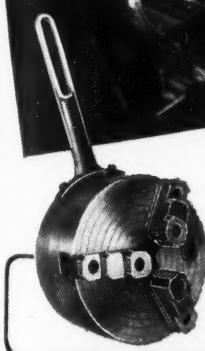
internally converted direct current, that is said to provide for unusually fast switching operations for high speed counting, limiting travel, and so on. The device can be used to measure light intensity in addition to acting as a switch. Provision is also made in the housing for enabling the device to be used as a combination counter or meter. Moreover, the internal arrangement of the device provides for filters for color or infra-red (invisible) operation. An unusually fine and large light gathering lens (2 inches in diameter), together with a directional internal optical arrangement (selective only to light received from a 5-deg. arc), makes the device adaptable to various gaging, measuring, and controlling applications without the use of a sensitivity adjustment.

According to the manufacturer, the O'Connor Electronic Handyman will continue to operate over a wide range of line voltage shifts. Internal taps may be adjusted for many entirely different voltage operating levels. With suitable additive mechanisms available from the company, the Handyman can be used to start and stop machinery; protect machine operators by throwing protective beams of light in front of press jaws, and so on; de-



O'Connor Electronic Handyman

tect fire and smoke; open and close doors; count; record; scan; register; position; sort; guard; inspect for color, size, shape, opacity, and smoothness; provide remote control, web loop control, and perform numerous other jobs.

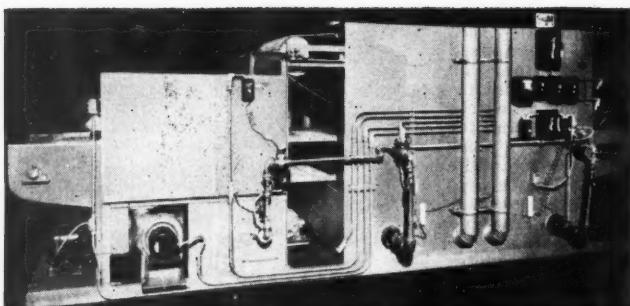


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Washing Machine



Mabor Triple Stage Washing Machine

A triple stage washing machine has been developed by the Mabor Co., Clark Township, Rahway, N. J., for the processing of light, small, cup-shaped stampings of comparatively uniform depth. The design of the equipment provides a washing stage, a rinsing stage, and a section wherein the parts are dried. The hold-down conveyor can be adjusted to accommodate various types of parts, so that

high, continuous production can be achieved.

The machine illustrated is gas heated by means of immersion combustion burners, although any heating method can be utilized. Any one of the three processing stages can be eliminated or additional processing stages may be added in order to bring parts nearer the point where they can be used for assembly.

Pumps are close-coupled, and the air heat device is direct-fired, although indirect firing may be substituted, if required. In order to ensure maximum safety in the operation of the equipment, it is fully equipped with automatic safety devices for gas burners and temperature controls.

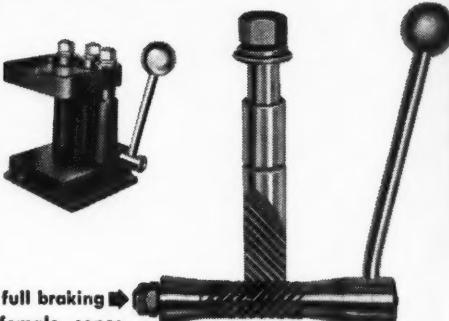
"CONE-LOK" JIGS

- MECHANICAL SIMPLICITY
 - ADAPTABILITY
- RUGGED CONSTRUCTION
 - CHIP PROTECTION
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 - MAXIMUM SAFETY

The Woodworth "CONE-LOK" jig utilizes the full braking power of its perfectly mated male and female cones.

ACCURACY
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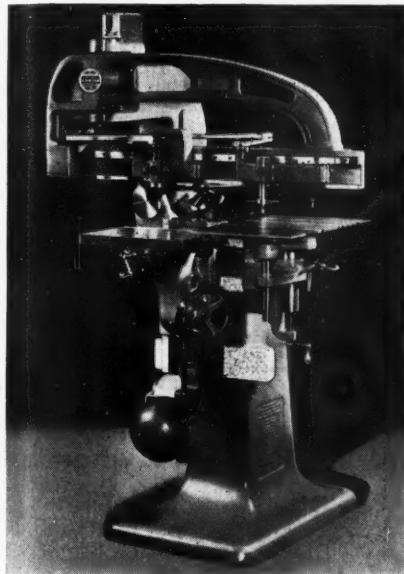


WOODWORTH

N. A. WOODWORTH CO., SALES DIVISION • 1300 E. NINE MILE RD., DETROIT 20, MICH.

Gorton P13 3-Dimensional Pantograph Machine

Designated as the P13, a 3-dimensional pantograph machine featuring a "Ratio-bar" tracer control is announced by the George Gorton Machine Co., 1710 Racine St., Racine, Wis. Supported at either end by the ruggedly constructed and delicately balanced overarm of the machine, the Ratio-bar is said to align the pivot center, cutter spindle, and tracing style in an ab-



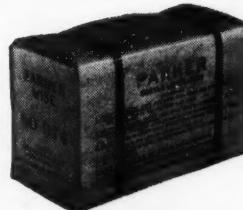
Gorton P13 3-Dimensional Pantograph Machine

solutely straight line, and is claimed to simplify accurate ratio setting by maintaining this straight line at all pantograph settings.

An additional advantage of the Ratio-bar is the fact that there is only one slider block to adjust for whatever reduction ratio is desired, thereby greatly reducing the chance for error. The Ratio-bar is a rugged, aluminum alloy horizontally pivoted casting on which are mounted two hardened and ground steel tracks. The tracer style and cutter spindle float on precision ball bearings which travel in these tracks. The construction is described as extremely flexible and, at the same time, very rigid.



● From mighty grip of steel jaws to locking swivel base—Parker vises are active tools for production. Famous for "extra" features that increase their versatility—these rugged vises are designed to boost output and cut costs in your plant. For profitable vise performance, specify Parkers next time! The Charles Parker Co., Meriden, Conn.



NEWS! Parker Vises are now individually packaged—with model number and selling features plainly printed—easy to handle, stock, sell and deliver—another Parker "First" Feature!

PARKER VISES



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The Ratiobar is arranged so that it carries the weight of the entire pantograph mechanism. An additional advantage is that as the tracer moves out and away from the pivot center, the pantograph linkages move toward it, thereby maintaining a good balance.

Said to be ideally suited for the production of small intricate dies, molds, hubs, and stamps, in addition to the conventional type of work usually associated with light pantograph machines, the P13 employs an enlarged 3-dimensional master or pattern which is mounted on the copy table. The surface of this master is traced in three dimensions manually with the tracing style, while the cutter reproduces at the desired ratio of reduction on the workpiece all of the angles, curves, and surfaces of the master.

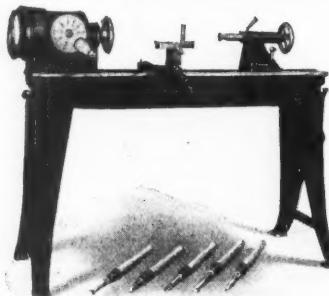
According to the manufacturer, 3-dimensional steel stamps can be cut on the P13 to close limits. The machine can also be used to produce jewelry hubs and dies of intricate design, as well as hubs and dies used in the plastics industry. Punches having identical multiple sections can be produced from simple one-section masters. Different sizes can be produced from the same master by changing the pantograph ratio or by changing the tracing style and cutter sizes.

The P13 is said to be ideal for cutting small precision embossing dies calling for fine details with the aid of semi-skilled operators. The machine can also be easily adapted for general 2-dimensional light milling and engraving. When used with the Gorton roll attachment, light milling and engraving can be performed on cylinders, rolls, tubes, dials, or on any peripheral surface.

Ratios from 2 to 1 to 40 to 1 are obtainable. The pantograph bar is graduated for reductions of 1:2, 1:3, 1:4, 1:6, 1:8, 1:12, and 1:16. Other reductions can be readily adjusted due to the fact that only one sliding adjustment is necessary. For enlarging work, the tracing style and cutter spindle assemblies are removed and their positions reversed on the Ratiobar.

The P13 cutter spindle is a high precision unit of simple, sturdy construction. It is entirely self-contained and quickly removable for grinding cutters in place in the spindle. A hinged cutter head permits spindle removal from the side, thus eliminating the necessity for disturbing work by lowering the table. A plunger locks the spindle for flat surface engraving or releases it for floating vertical movement of $\frac{1}{2}$ inch with forming guide on curved work. All parts of the complete spindle assembly are made of alloy steel.

"OLIVER" Metal Spinning Lathe



This 12" Lathe has rigid, heavy bed, and extra large bearings in headstock. Ball bearing headstock is motor driven—adjustable 800 to 2750 RPM. Live tail center. Four larger size Spinning Lathes also available.

Write for Illustrated Bulletins

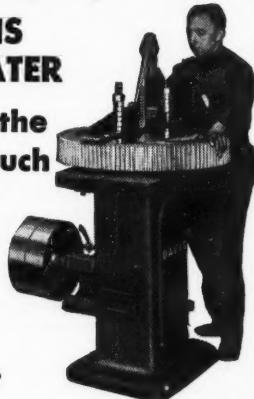
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Grand Rapids 2, Michigan

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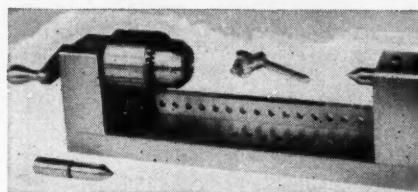
and are hardened and ground inside and out to precision tolerances. Precision pre-loaded ball bearings are said to eliminate all end play. The spindle top is provided with an inside oil reservoir having a filter for preventing dirt from entering the bearings. Milled slots in the spindle pulley allow for indexing in grinding flats on cutters. Unless otherwise specified, the machine is supplied with a collet-type spindle which has a $\frac{1}{8}$ -inch diameter hole for a straight shank cutter.

"Whirlijig"

Featuring a 12-inch long base and designed to accommodate work up to $3\frac{1}{2}$ inches in diameter between centers, the "Whirlijig" illustrated herewith is now being marketed by the Gustave C. Lindquist Co., 188 N. Hudson, Coldwater, Mich. According to the manufacturer, the unit can be used on a surface grinder in grinding tapers (using sine bar), grinding or backing off reamers, grinding counterbores, producing leads on taps, grinding broaches, touching up lathe and grinding centers, grinding drills, grinding pins and screw ends, reducing stock diameters, resharpening cutters and end

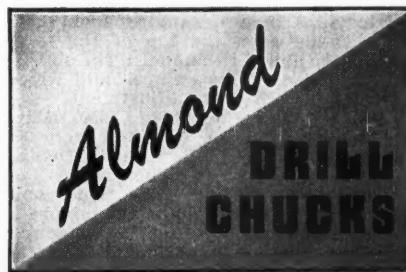
mills, grinding radii on stock, and so on.

The Whirlijig is made of machine steel which is hardened and deep frozen set. All sides of the unit are said to be square,



"Whirlijig"

and the Whirlijig is adjustable for accommodating work of different lengths by simply removing two Allen screws from the ends of the jig. The center shown on the right-hand end of the jig in the accompanying illustration is spring loaded. When two centers are required, the chuck on the left-hand end of the jig can be readily replaced with a spare male center supplied with the jig. Female centers are also available for the unit.



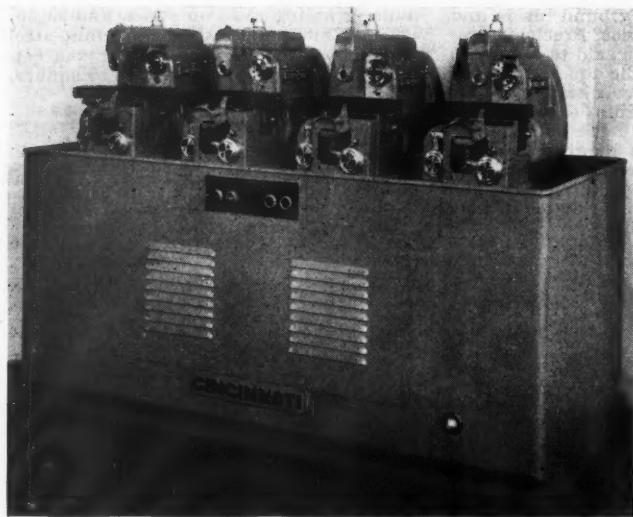
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ALMOND THREE JAW DRILL CHUCKS are furnished in 9 sizes with capacities from $3/16''$ to $1''$. These are made in heavy and light duty types with a taper arbor hole or with a threaded arbor hole. For Portable Drills.

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T. R. ALMOND MFG. CO.
ASHBURNHAM MASSACHUSETTS



Cincinnati No. 000-4
Unit Type Milling
Machine

Cincinnati No. 000-4 Unit Type Milling Machine

A production milling machine, the No. 300-4 Unit Type, has been developed by The Cincinnati Milling Machine Co., Cincinnati 9, Ohio. The machine is designed especially for the rapid, economical production of the multitude of small parts required in the manufacture of sewing machines, business machines, cash registers, firearms, small tools, and so on.

The Cincinnati No. 000-4 is comprised of four individual milling machines of extremely small size mounted together on a single base. The machine is said to be ideally suited to production flow, since four separate operations may be performed progressively by the different units. The machine units are completely hy-

draulic, having piston and cylinder table feed and balanced, axial-type hydraulic motors for spindle drive. The reservoir, motor, and pump which supply the hydraulic pressure for powering the machine units are accessibly mounted in the base.

Each machine unit is, in effect, a miniature, fixed bed, manufacturing type ma-

chine of sturdy proportions. The bed and column of each unit is cast in one piece, and the spindle carrier is adjustably mounted on square-gibbed bearing ways on the column. Table travel is 4 inches and vertical adjustment of the spindle carrier is 3 inches, ranging from 2 to 5 inches between the top of the table and center line of the spindle. The spindle is ball bearing mounted in a quill which provides $\frac{1}{2}$ -inch cross adjustment.

Standard ranges are from 1 to 40 inches per minute for table feed and from 500 to 1,800 r.p.m. for spindle speeds, although considerably lower or higher ranges can be supplied if desired. The table rapid traverse rate is 200 inches per minute.

Feed and speed rates for each machine unit are selected independently of the other units. Feed rates are selected by a

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single knob and pointer on the front of each machine unit and, being infinitely variable over their entire range, permit the selection of the exact feed rate desired. Spindle speeds are divided into two ranges, with speeds infinitely variable within each range by means of a single knob and pointer control at the front of each unit. A single V-belt and a pair of two-step sheaves at the rear of the spindle carrier provide the means for selection of the desired speed range.

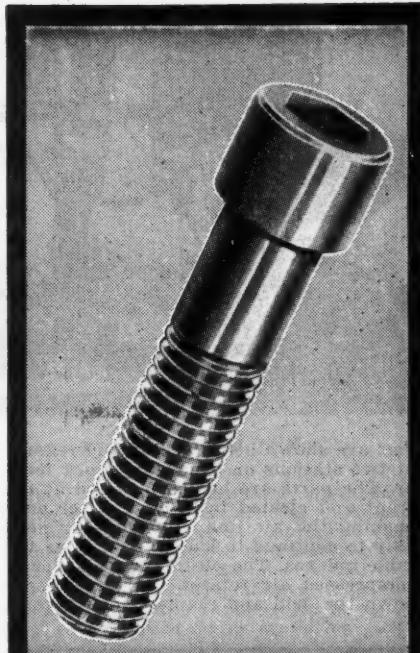
Table operating cycles are completely automatic and are started by flipping a small lever at the front of each machine unit. Dog control of the cycle permits the use of intermittent feed and rapid traverse strokes if required. The table feeds in either direction and operation can be either single cycle or continuous cycle as desired. The continuous cycle permits the use of magazine and hopper feeding devices.

Table reverse from feed can be accomplished by dog control or by a positive stop and hydraulic reverse. The latter method is said to provide for extremely accurate reversal by feeding the table against an adjustable positive stop, after which pressure changes within the hydraulic system cause reversal of table direction. The table trip from rapid traverse to feed is also said to be extremely accurate. The cycle control dogs are mounted on a removable dog rail, thus permitting the dog rail to be mounted on the fixture to effect an important saving of set-up time when changing jobs.

The direction of spindle rotation can be reversed by reversing the hydraulic lines to the spindle drive motor, or, if desired, quick-change couplings or a reversing valve can be supplied. Detachable hydraulic spindle stop units are supplied which are individually detachable for each machine unit to permit the use of any desired combination of cycles on the separate machine units. The spindle nose has a No. 20 Series National Standard taper, and a fixed overarm with adjustable arbor support is available for use with arbor-mounted cutters. The overarm is detachable to permit its removal when not required.

Mead Rotary Work Feeder

For increasing the production of a wide variety of small items on drill presses, the Mead Specialties Co., Dept. F-42, 4114 N. Knox Ave., Chicago 41, Ill., is now offering a rotary work feeder. In the accompanying illustration, brass valve bo-



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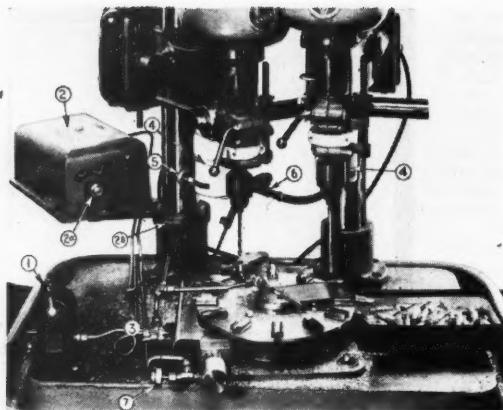


Illustration showing Mead Rotary Work Feeder set up on a drill press for use in drilling and reaming brass valve bodies

dies are shown being drilled and reamed at two stations on the rotary work feeder. The parts are loaded by hand at the front and ejected by a cam. After once opening the air line, the operator need only to continue to load the parts as the table indexes. The clean, quick power of compressed air rotates the table, feeds down the drill and reamer with uniform

speed and pressure, blows away the chips, and ejects the finished workpieces. The table locks in place at each station, and the arrangement of the operating valves prevents motion except when the drill and reamer are clear of the work.

The complete setup includes a (1) master valve (stops and starts entire system); (2) Mead pneumatic timer (controls number of cycles per minute and actuates rotary work feeder); (2a) two-way

speed control valve (regulates cycle of pneumatic timer); (2b) adjustable mounting bracket for pneumatic timer; (3) drill feed operating valve; (4) drill feed power cylinders; (5) drill feed speed control valve; (6) T-connection to supply both cylinders; and (7) two-way speed control valve for rotary work feeder.



This new, streamlined bench type grinder assures fast, quality finishing on metals, plastics, wood, fibre . . . at low cost. Built to machine tool specifications, Standard D-4 is equipped with improved band tension control and specially designed protective motor hood. 4x36 $\frac{1}{4}$ " band. The ideal portable unit.

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ANNOUNCING

A New Member in the M&N Line of Hydraulic Presses **THE 30-TON ELECTRIC HOT PLATE MOLDING PRESS**

This new press is especially designed for the rubber and plastics industries, where speed and ease of operation is essential to low cost production, and laboratory uses. This press can be had with any desired number of openings, either electric heated or steam platens, at a slight additional cost; or larger platens. Motor driven hydraulic power units are also available.

Outstanding features of this new press include: Visual temperature indicator. Electrically heated thermostatically controlled platens. Dual pressure hand pump. Compactness. Large platen area. All steel construction.

SPECIFICATIONS: Size of Base, 16"x12"; Overall height, 42"; Platen size, 12"x12"; Capacity, 30 tons; Daylight opening, 10"; Stroke, 6"; Ram dia., 5"; Approx. Weight, 400 lbs.



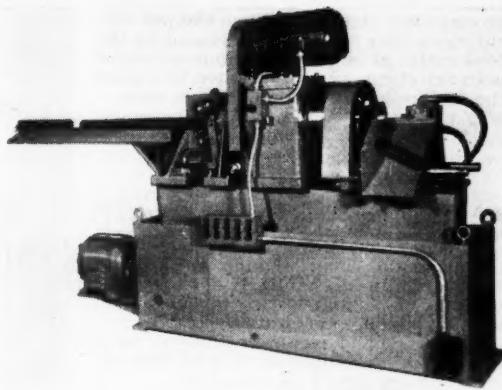
\$525.00

M&N MACHINE TOOL WORKS INC.
144 Orono St. Clifton, N.J.

Pines Fully Automatic Cut-Off Machine

High production and accuracy of cut lengths of pipe and tubing are outstanding features claimed for the Pine Fully Automatic Cut-Off Machine illustrated herewith, product of the Pines Engineering Co., Aurora, Ill. The work is fed by motor-driven rolls through a hollow spindle and against an adjustable receding target stop. A rotating head automatically cuts the work to the required length, producing a square face and holding end-to-end dimensions within a few thousandths inch of requirements. The head is tooled to produce a clean cut with a minimum of burrs raised.

According to the manufacturer, a production of 1,500 pieces per hour is possible with the machine, depending upon the composition of the stock, wall thickness, and diameter. Once the machine is started, the operation is continuous until the machine runs out of stock. The time required to complete a cycle is 1½ seconds.

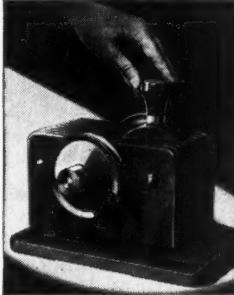


Pines Fully Automatic Cut-Off Machine

The Pines Fully Automatic Cut-Off Machine is designed for general duty and can be quickly adjusted to produce cut-off pieces to suit length and diameter requirements. The spindle inserts and collets may be readily changed, and the toolholders permit rapid adjustment to meet conditions of diameter. Either part-

ONE WAY...To Increase Production With New (or Old) Machinery

SELECT-O-SPEED speeds up to 10 to 1 ratio, from fractional to 7½ h.p. Lever, hand wheel, or electric motorized control.



Lovejoy-IDEAL Variable Speed Controls

50,000 users have found the IDEAL answer to adjusting machinery speed for different sizes and types of metal. There is an IDEAL Speed Control for every requirement of metal working equipment. Easily installed in line drive of old or new equipment. Also, Variable Speed Pulleys, Wide V-Belt Sheaves, Wide V-Belts, Adjustable Motor Bases.

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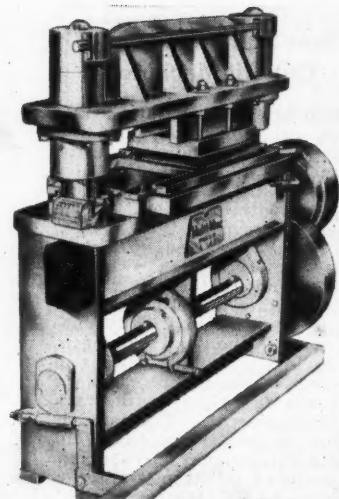
ing tool bits or rotary cut-off discs may be employed, depending upon the job. Uncut stock may be manually placed on the feed rolls, or a power driven conveyor with selector may be furnished to supply the feed rolls direct from storage rails.

Multi-Max Press

A 30-ton combination shear and press is now being offered by the Parker Manufacturing Co., 2200 Colorado Ave., Santa Monica, Calif. Mechanically operated, the machine is designed to shear, blank, notch, punch, perforate, slot, pierce, lance, bend, and form sheet metal parts in single or multiple units with one operator.

According to the manufacturer, the Multi-Max Press, which occupies a floor space of 36 x 75 inches, requires no special foundation and has no overhanging parts. Due to its small, compact size, the machine can be easily picked up and moved in and out of the production line as needed. Finished parts can be fabricated right at the point of assembly in required amounts.

The Multi-Max Press is of steel plate



Multi-Max Press

welded construction, normalized after welding to relieve stresses. The stroke of the press is 2 inches, as is the ram adjustment. The shut height is 10 inches. The machine has a bed die space of 12 x 36 inches, ram die space of 10 x 36 inches, and bed opening of 5 x 32 inches. A 1½ h.p. three-phase motor is furnished with the press, which is said to be capable of producing 100 strokes per minute. The press bed is located 32 inches from the floor, and the overall height of the machine is 57 inches. The shipping weight is approximately 3,250 lb. With proper sets of dies, combination shearing, blanking, and forming operations can be economically performed with one operator for long production or short fill-in runs.

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12 Speed Geared Head Motor Drive
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Modern Design—
Liberal Dimensions.

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**THE CARROLL & JAMIESON
MACHINE TOOL CO.**

Trojan Electric Motor Traveled Monorail Tractor

An electric motor traveled monorail tractor which is said to feature a new idea in traction effectiveness is now being introduced under the trade name of Trojan by the Detroit Hoist & Machine Co., 8226 Morrow St., Detroit 11, Mich. The tractor suspended on a pair of wheels that operates on the top surfaces of an overhead monorail beam flange is so fulcrumed that its own weight exerts a pres-



Trojan Electric Motor Traveled Monorail Tractor

sure against a second pair of wheels which operates on the underside of the flange. The result is an effective "biting action" that permits a relatively small,

compact, lightweight tractor to travel comparatively heavy loads even up inclined monorails.

The Trojan Tractor can be applied to travel existing hand-operated monorail hoists by power, as well as to travel monorail conveyor lines, open and close garage doors and airport hanger doors. In slightly altered form, it can be applied to travel existing hand-operated crane bridges by power. According to the manufacturer, many material handling and various other types of units at present hand operated and difficult to move can be powered traveled quickly and economically by the tractor.

Brown & Sharpe Electronic Measuring Equipment

The Brown & Sharpe Manufacturing Co., Providence 1, R. I., announces electronic measuring equipment having features of design and advantages of operation that are said to facilitate the taking of extremely accurate measurements and make quality control unusually easy to achieve. Included in the equipment is a No. 950 amplifier (indicated at A in the accompanying illustration) which has fea-

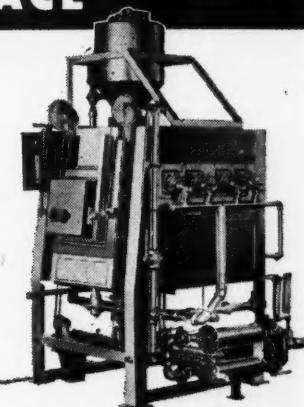
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1. GENERAL HEAT TREATING 2. GAS CARBURIZING

This furnace produces its own prepared gas atmosphere for general heat treating. For gas carburizing this atmosphere is enriched and recirculated by a special mechanism. During gas carburizing treatment only a portion of the gas is passed through the recirculating system, thereby preventing the cooling of the entire gas flow. Only about 10% is removed from the muffle at any one time. Twin filter units are incorporated to avoid shut-down for filter cleaning.

This is an ideal furnace for the plant requiring both clean hardening and gas carburizing operations.

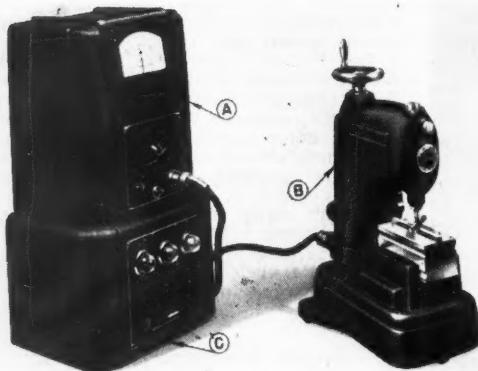
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'Surface'
Standard Rated
FURNACES
SURFACE COMBUSTION CORPORATION, TOLEDO 1, OHIO

WRITE FOR
FULL
DETAILS

Brown & Sharpe Electronic
Measuring Equipment



tures of simplified setting with accurate linear graduations that promote correspondingly accurate measurements. The amplifier permits settings from 0.0001 to 0.00001 inch and, since it is a separate unit, all of the important heating generating equipment contained in it is divorced from the actual measuring apparatus, thus preventing temperature drift difficulties, it is claimed. The graduation

selector of the amplifier can be set for readings in 0.0001, 0.00005, 0.000025, 0.00002, and 0.00001 inch. Measurements between these graduations can be easily made to match tolerance limits on the work being tested.

The No. 951 external comparator indicated at B in the illustration has a range of from 0 to 4 inches and is designed to measure 0.0001 to 0.00001 inch. The setting of this instrument is said to be easily accomplished with the aid of only one master. The anvil is reversible and, in addition to its regular surface, provides a narrow surface for small parts or work of irregular shape. The comparator has adjustable measuring pressure and is self-checking, thereby permitting the instrument to be checked at any time without gage blocks or other masters. It is regularly furnished with a diamond gaging point.

For operators desiring to utilize colored signal lights as a means of identifying quickly and without confusion the size of piece being tested, the No. 958 signal light attachment shown at C is provided for use with the No. 950 amplifier. The attachment includes three glow type lamps. For external measurements, a red light indicates when the workpiece is too small, a blue light when the workpiece is too large, and an amber light when it is within the required tolerance. When the attachment is used for internal measurements, the reverse condition is true and the red light indicates when the workpiece is too large and the blue light when it is too small.

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Marks any combination of numbers with clear impression. Can also be furnished with letters or combination of letters and numbers. Made of fine quality, hardened steel for long service. Write for further details.

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Optional Large Wheels for
Lyon-Raymond Hydraulic
Elevating Table

For conditions requiring larger wheels, the Lyon-Raymond Corp., 4170 Madison St., Greene, N. Y., is now prepared to offer 10-inch diameter x 2-inch face semi-steel wheels in place of the 5-inch rigid casters regularly furnished on the Lyon-Raymond Hydraulic Elevating Table. The axle bracket is designed for attachment

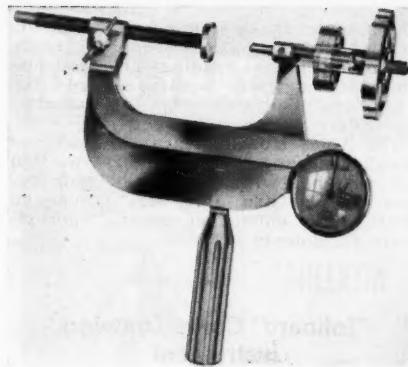
to the base plate by the same bolt holes as used for the rigid caster and may be furnished for any table already in use that is equipped with 5-inch casters, as well as on new equipment.

The larger wheels extend beyond the table top 3 inches on each side, thus making the overall width of the unit, including wheels, 36 inches. The wheels do not extend in front of the table.

Ames Model 4 Hardness Tester

Identified as the Model 4, a 4-inch capacity portable hardness tester weighing slightly over 3 lb. and reading directly in the Rockwell hardness scales is now being offered by the Ames Precision Machine Works, Waltham 54, Mass. Rounds and flats, both hard and soft, from very thin up to 4 inches can be quickly and accurately tested with the unit, which is well balanced for easy handling and constructed to provide for long life.

The frame of the Ames Model 4 Hardness Tester is shaped like that of an ordinary 4-inch micrometer and is sprung slightly when pressures are applied to the penetrators by turning a handwheel. A diamond penetrator is used for testing



Ames Model 4 Hardness Tester

hardened steel and ball penetrators for testing soft materials, as specified in the Rockwell chart. A lever extending across the front of the frame actuates a dial indicator when pressures are applied and released. The indicator dial includes graduation lines which show when pressures of 60, 100, and 150 kilograms are applied

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Mac-it Hollow Lock Screws provide a locking arrangement that combines convenience with positive locking action. They lock as effectively after many thousand adjustments as they do the first time. All Mac-it screws are heat-treated and accurately made with die-cut threads. Whatever your needs, let the complete Mac-it line serve you. Sold through recognized distributors from coast to coast and in Canada.

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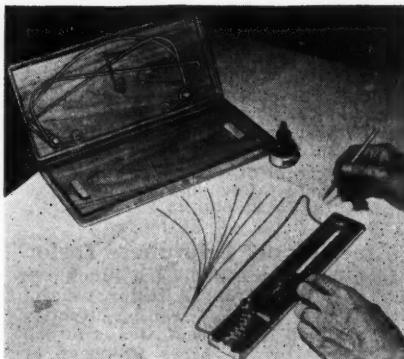
by turning the handwheel. Rockwell readings are taken from a graduated barrel dial, which is located beneath a Lucite magnifier for easy reading. The hardened anvil of the tester is threaded into the frame and is adjustable for accommodating different sizes of work.

The Ames Model 4 Hardness Tester is supplied packed in an attractive wooden box together with test blocks, penetrators, anvils, and Rockwell conversion chart. The entire set weighs approximately 8 pounds.

"Infinarc" Curve Drawing Instrument

Known as the "Infinarc," an instrument for drawing curves has been announced by the Cook Specialty Co., Green Lane, Pa. The desired curve is obtained with specially tempered wire forms whose shape is altered by moving either or both of two adjustment screws along slots.

The Infinarc is available with a 12-inch base and four preformed wire curves for producing almost any shape desired, including reverse curves, to meet the need



"Infinarc" Curve Drawing Instrument

of engineers, designers, draftsmen, architects, pattern and template makers. The four wires can be easily and quickly interchanged by snapping loops over the ends of the adjustment screws.

The Infinarc Curve Drawing Instrument is made entirely of steel and is supplied in an attractive wood case.

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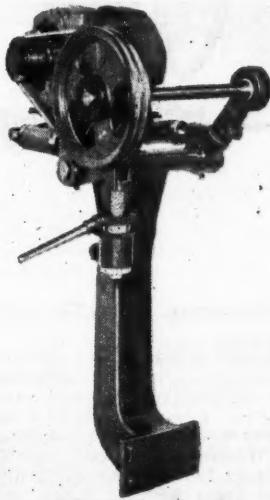
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Berkeley Power Drive

The Berkeley Power Drive shown in the accompanying illustration is now being marketed by The Danville Tool Corp., 1015 Maple Ave., Danville, Ill. The Tension-Trol feature of the unit enables the operator by a simple turn of the Tension-Trol handle to adjust the shaft centers for any desired belt tension.

According to the manufacturer, speed change of the machine on which the Berkeley Power Drive is installed can be effected quickly and accurately with the Tension-Trol. A turn of the Tension-Trol



Berkeley Power Drive

handle reduces the distance of the cone shaft centers, thereby enabling the operator to slip the belt from step to step easily and quickly. A tightening turn of the Tension-Trol handle assures correct belt tension immediately, it is claimed.

In effecting motorization of machines, the Berkeley Power Drive is said to possess the essential advantage of delivering full driving power required by the demand for unusually deep cuts and high speeds. The design and construction of the unit provides for simplified installation, maximum strength, and safety. The drive is available in designs which are adaptable to all types of machines, including lathes, screw machines, grinders, shapers, milling machines, and so on.

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"Wycomatic" Speed Changer

Designed to provide the operator with complete speed control of a precision shaft which can be instantly adjusted to any desired speed for different sizes of grinding wheels or for any of the many operations requiring a wide range of speeds, a variable speed flexible shaft machine to be known as the "Wycomatic" Speed Changer is announced by Wyzenbeek & Staff, Inc., 838 W. Hubbard Ct., Chicago 22, Ill. By means of an adjustable dial control, the speed of the machine can be gradually changed from its slowest to fastest point. With a twist of the wrist, the operator can select any low speed, such as that ordinarily used for wire brushing, any of the intermediate speeds for sanding, burring, or grinding, or any high speed suitable for resinoid bond grinding or for small diameter wheels.

Additional features of the Wycomatic Speed Changer include a safety cabinet which swivels on a ball bearing motor base and fully encloses the speed change mechanism and belt guard; low center of gravity which is said to prevent tipping of the unit; a specially designed eccentric lock which can be used to hold

a handpiece so firmly that the machine can be employed as a stationary grinder; and an eccentric adjustment on the jack-shaft for belt tightening. In addition,



"Wycomatic" Speed Changer

**SAVES
TOOL MAKERS' TIME
T R O Y K E
ROTARY TABLES**



Catalog on request

TROYKE MFG. CO.

4322 Appleton St., Cincinnati 9, Ohio

the Wycomatic is equipped with a precision shaft containing a patented non-metallic inner-liner, precision handpiece, wheel arbor, 6-inch grinding wheel, and wheel guard with outboard handle.

The Wycomatic Speed Changer is available in four models of $\frac{1}{2}$ h.p. with speed of from 1,800 to 4,000 r.p.m.; $\frac{3}{4}$ h.p. with speed of from 1,800 to 4,000 r.p.m.; $\frac{3}{4}$ h.p. with speed of from 3,000 to 5,800 r.p.m.; and 1 h.p. with speed of from 2,200 to 4,200 r.p.m. All models are available with 50 or 60-cycle single-phase on 3-phase motors.

Denison Redesigned Hydraulic Index Table

Although designed expressly for use with the Denison Multipress or Multi-Unit press, the Denison Redesigned Hydraulic Index Table shown in the accompanying illustration can be used with other equipment where a source of hydraulic power is available. Product of the Denison Engineering Co., 1153 Dublin Rd., Columbus 16, Ohio, the table is constructed for operation directly off the hydraulic system



Multipress Equipped with Denison Redesigned Hydraulic Index Table

of the press with which it is being used. According to the manufacturer, the action of the index table is interlocked and positive; the press ram cannot descend while the table is in motion, and the table will not rotate until the ram has complet-

ed its cycle. The dial of the table is actuated by a Denison HydrOILic fluid motor through a conventional Geneva-arbor and driver mechanism. The fluid motor is provided with speed control regulation, thus permitting 10 to 70 indexes per minute. When used with the Multipress, the action of the table and press is completely automatic, thereby allowing the operator to stand well away from the ram for maximum safety of operation.

Provision has been made to permit a "through" punching at a station 120 deg. on either side of the pressing station. In addition, air blast or mechanical knock-out ejection may be employed. For added versatility, a "skip-station" feature can be furnished with the table which permits the pressing ram to skip any number of specified stations around the dial. This feature is said to be of particular value on short production runs or where tooling size restricts the number of stations which may be used on the dial.

Sidney 12-Speed Gap Lathe

The accompanying illustration shows the Sidney 12-Speed Gap Lathe now being manufactured by The Sidney Machine

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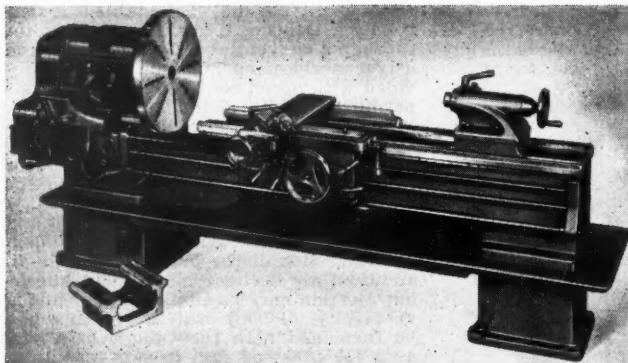
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Sidney 12-Speed Gap Lathe

Tool Co., Sidney, Ohio. Features of the machine include a 12-speed sliding spur tooth geared headstock; four-wall bed construction with removable gap block; chip-proof gearbox; and offset compound with large micrometer dials.

The Sidney 12-Speed Gap Lathe is available in 14, 16, 18, and 20-inch sizes and can be furnished in either the English or metric systems of threading or a combination of both.

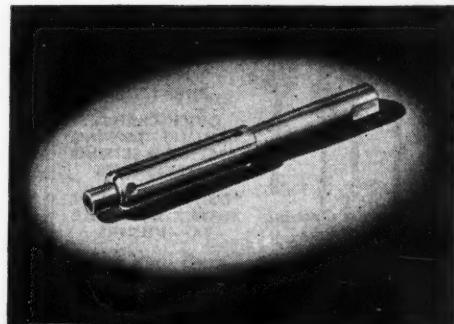
per minute to be obtained is announced by the Fast Feed Machine Corp., 240 Kinkle Bldg., Ashtabula, Ohio.

Features of the press include main bronze bearings running from the front to the rear of the crankshaft and having ample oil groove for efficient lubrication; flywheel located out of the operator's working area and provided with SKF ball and thrust bearings; motor designed for finger-tip variable speed control and lo-

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- hundreds of solid mandrels and
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- much! Champions completely
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- large and small jobs. You can
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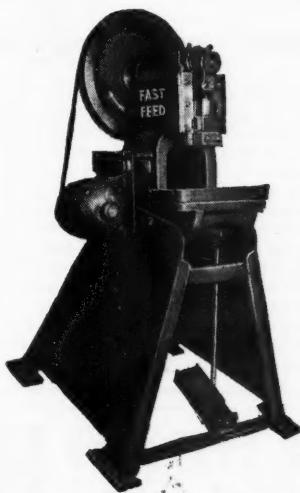
Expanding Mandrels



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cated within easy reach of the operator; crankshaft which can be operated in oil bath or grease at high speeds; legs of welded construction; high tensile cast iron main frame; and positive safety clutch of mechanical swing dog type. The clutch mechanism can be set for positive single or continuous stroke. A standard knockout is supplied with all models. The bronze crankshaft bearings



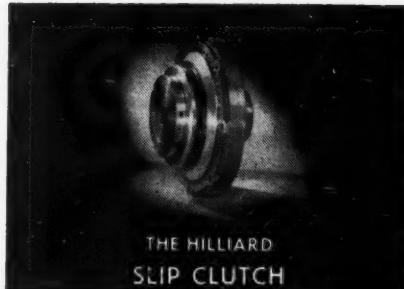
Fast Feed Open-Back Inclinable Punch Press

and Pitnam rod bearings have Alemite fittings, and Alemite fittings are also provided on the end of the crankshaft for pressure lubrication to the flywheel.

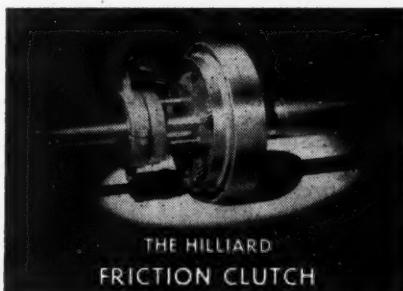
Steen High Speed Pipe and Tube Cutter

The Steen High Speed Pipe and Tube Cutter illustrated herewith is now being manufactured by the Continental Machine Co., 1952 Maud Ave., Chicago 14, Ill. The unit is made in three sizes designated as the Nos. 3, 6, and 12 for cutting pipe or tubes from $\frac{1}{2}$ to 3 inches, $\frac{1}{2}$ to 6 inches, and 3 to 12 inches in diameter respectively. A simple attachment can be obtained for the Nos. 3 or 6 for cutting pipe from $\frac{1}{2}$ to $\frac{1}{2}$ inch in diameter.

The shaft of the cutter is made of chrome-nickel steel which is heat treated



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INDUSTRIAL CLUTCHES.

for toughness and provided with a large roller bearing to eliminate friction and thereby reduce operating power. The gears of the unit are also made of heat-



Steen High Speed Pipe and Tube Cutter

treated chrome-nickel steel. The cutter block rolls are made of hardened tool steel and are provided with roller bearings and tool steel pins which allow the pipe or tube to turn freely.

On the Nos. 3 and 6 tube and pipe cut-

ters, the improved gage works automatically with the cutter arm, thereby enabling maximum output to be obtained with wear and friction on the gage reduced to a minimum. As the cutter becomes engaged with the pipe or tube, the gage is automatically released. The cutter blades are designed to withstand constant use on new and old pipes and are made with standard double bevels or long bevels.

"Standard" Indium Bronze Guide Pin Bushing

A low friction guide pin bushing which is said to greatly increase the accurate life of die sets has been announced by the Standard Machinery Co., Providence, R. I. The heavy duty precision bushing consists of a basic hard steel body and a special bearing bronze liner electrolytically alloyed with Indium. The bushing is hardened and ground inside and out so that it can be installed and removed from the die set without scuffing. The liner, keyed firmly in position by an internal groove, is formed from special bearing bronze rolled to a precision gauge and provided with coined, spherical impressions which

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CADILLAC CUTTER COMPANY

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serve as oil pockets or reservoirs. The liner is installed in the bushing under pressure and is sized by a burnishing operation so as to keep it in intimate contact with the bushing and correct the inside diameter for precise fit with the guide pin.

An electrolytic plating and heat treatment process produces a layer of Indium

over the entire liner bearing area, penetrating the surface. Indium is a non-corroding metallic element with inherent lubricating qualities which are said to reduce the coefficient of friction and eliminate galling or seizure when normal lubrication is temporarily suspended. An additional advantage claimed for Indium is its ability to be alloyed by diffusion into the surface of non-ferrous metals by

heat treatment. The alloys so formed are harder than the Indium or the base metal, and the resulting skin or case increases resistance to wear and considerably prolongs the accurate fit of the bushing and guide pin, it is claimed.

The "Standard" Indium Bronze Bushing is available in seven inside diameter sizes ranging from 1 to 3 inches inclusive and, when specified, can be furnished in "Standard" steel die sets.

Bantam Bully Blow Gun

Featuring a regulating trigger which provides a fully controllable air flow from a gentle puff to a powerful blast, the Bantam Bully Blow Gun illustrated here-with has been placed on the market by the Superior Manufacturing Co., 961 Public Square Bldg., Cleveland 13, Ohio. The gun is said to be ideal for use in shops, foundries, and factories of all types; in garages and repair shops wherever air is used for blowing away chips, filings, borings, sand, lint, dust, and dirt; for cleaning patterns, molds, looms, spring frames, automobile upholstery, fuel lines, armatures, and carburetors; for cleaning shelves, bins, and other applications.

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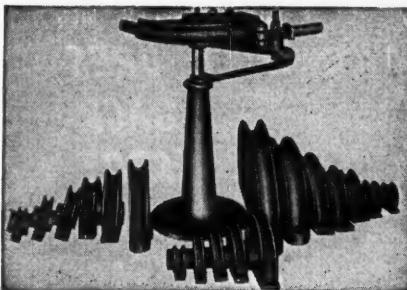
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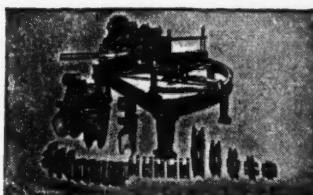
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Made of high strength aluminum, the Bantam Bully Blow Gun is claimed to be unusually strong yet light in weight so as to provide for ease of handling.



Bantam Bully Blow Gun

Said to be absolutely leakproof, the gun includes a handy hanger bar at the top which allows it to be hung quickly out of the way when not in use. The air connection is a standard $\frac{1}{4}$ -inch pipe thread. The net weight of the gun is approximately 10 oz. Guns are packed six in a standard carton having a shipping weight of approximately 5 pounds.

**High Speed
COUNTERBORES
BACK
SPOT
FACERS**

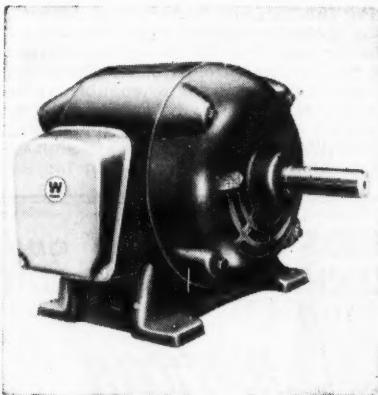
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BICKNELL-THOMAS COMPANY
Greenfield . Massachusetts

Westinghouse Life-Line Farmotor

Product of the Westinghouse Electric Corp., 306 Fourth Ave., Box 1017, Pittsburgh 30, Pa., the Westinghouse Life-Line Farmotor illustrated herewith features an all-steel construction and is available in sizes of 1, $1\frac{1}{2}$, 2, 3, 5, and $7\frac{1}{2}$ h.p. The motor is of the capacitor-start induction - run single - phase type with self-contained capacitor and transfer switch, the transfer switch being arranged to disconnect the starting capacitor as the motor reaches full speed.

The air openings for the motor are located in the lower half of the endbells, thus providing full protection against dripping liquids. Self-sealed prelubricated ball bearings afford effective lubrication for five years or longer without repacking, it is claimed. To provide maximum dielectric strength with high flexibility,



Westinghouse Life-Line Farmotor

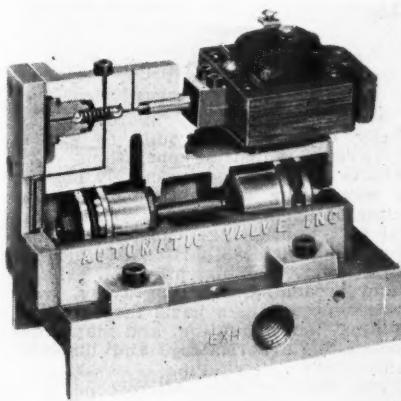
the motor incorporates Westinghouse Tuffernell insulation with Tufvar wire.

In the $1\frac{1}{2}$, and 2 h.p. sizes, the Westinghouse Life-Line Farmotor incorporates built-in manual reset thermostatic protection against excessive internal temperatures, resulting from overloads, too frequent starting, stoppage of ventilation, excessive surrounding room temperature, stalled motor, and operation on low voltage. The motor is available for operation on 220 volts, 60-cycle single-phase current and, it is claimed, will function successfully at normal frequency and rated load with the voltage 10 per cent above or below the name plate rating. The operating speed of the unit is 1,740 revolutions per minute.

Automatic SV-3 Solenoid Valve

Designated as the SV-3, a three-way three-port solenoid-operated air valve for controlling single-action air cylinders employed in machine tool operation is announced by Automatic Valve, Inc., 37415 Grand River, Farmington, Mich. According to the manufacturer, the valve is so light and compact that it can be attached close to air cylinders, thus eliminating excessive piping and a waste of air. Mounted in any position, it can be easily serviced without disturbing the piping.

Normally open or closed, the SV-3 is a balanced piston type valve which is pressure sealed and reversible in servicing and assembly. Due to the use of O-ring type seals, metal contacts are eliminated. The valve is available in $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, and $\frac{3}{4}$ -inch sizes and can be operated on

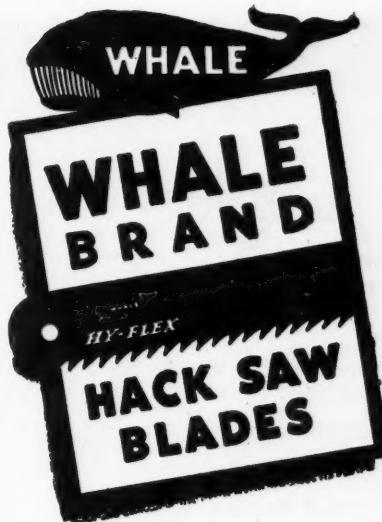


Automatic SV-3 Solenoid Valve

pressures of from 5 to 150 p.s.i. Operation power values are 1.42 amperes at in-rush and 0.22 ampere sealed for 110 volts, 60 cycles.

Mead Pneumatic Drill Press Feed

A pneumatic drill press feed is now being offered in two sizes designated as the Nos. 1 and 2 by the Mead Specialties Co., Dept. F-42, 4114 N. Knox Ave., Chicago 41, Ill. The No. 1 size, which is intended for use on 14-inch Delta, Buffalo, Atlas, and similar drill presses, has a 2 9/32-inch bore (4 times line pressure), approximate stroke of $2\frac{1}{4}$ inches, approximate weight

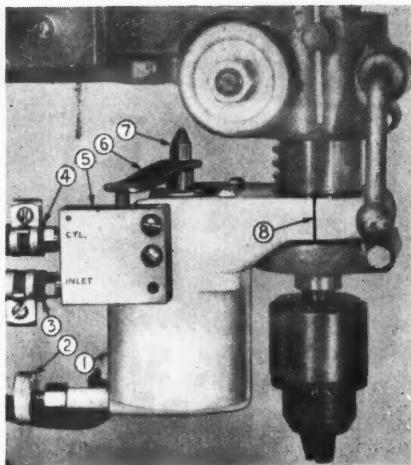


Every Forsberg Blade bears the famous WHALE BRAND mark of quality. Scientific heat treating and thorough check every step of the way, plus a severe bending pounds test gives Forsberg Blades superior performance. The popular HY-FLEX Blade meets today's demand for extreme flexibility at medium price—it has the guts for solid service.



A Whale of a Blade—MO-HY'S special molybdenum steel gives unusual cutting service—same speed as tungsten with comparable performance. For outstanding results on stubborn jobs, ask your mill supply house for WHALE BRAND HY-FLEX and MO-HY BLADES.





Mead Pneumatic Drill Press Feed

of 2 lbs., and capacity of $\frac{3}{8}$ inch in steel.

The No. 2 size, which is intended for 17-inch Delta, Buffalo, and similar presses, has a 3-inch bore (7 times line pressure), approximate stroke of 2 inches, approximate weight of 3 lb., and capacity of $\frac{3}{8}$ inch in steel. When obtained with a fixture actuating valve, the feed is designated as the No. 1a or No. 2a.

Referring to the accompanying illustration, the Mead Drill Press Feed consists of (1) a single-acting cylinder (4 times line pressure); (2) one-way speed control valve (for regulating feed of drill); (3) constant air line connection; (4) air line to work-holding fixture; (5) fixture operating valve (Model FC-2); (6) valve operating arm; (7) ram of power cylinder; and (8) split collar for attaching to spindle.

"Hytenat" High Tensile Strength Aluminum Castings

Designed to provide for minimum machining and maximum economy in the production of a wide variety of products, a line of non-heat treated high tensile strength aluminum castings is now being offered under the trade name of "Hytenat" by the B. & S Bronze Foundry, Inc., 3917 22nd St., Long Island City 1, N. Y. The castings are available in sizes from small precision instrument parts weighing a fraction of an ounce to huge castings as large as 6 feet in diameter and weighing up to several hundred lb.

According to the manufacturer, Hytenat High Tensile Strength Aluminum Castings provide for maximum strength without the need for heat treating, thus eliminating the danger of warpage and possible breakage.

Spencer Stereoscopic Shop Microscope

A stereoscopic shop microscope specially designed and built to expedite numerous industrial operations where minute details must be closely observed is now being offered under the trade name of Spencer by the American Optical Co., Southbridge, Mass. The microscope is said to be particularly useful in injection jet drilling, precision grinding, hand broaching, fine engraving, watch escapements, small parts inspection, die sinking, lens mounting, and many other toolmaking, fabricating, and inspection processes.

The Spencer Shop Microscope is designed to provide both stereoscopic vision and magnification of minute parts and details. The magnified image is seen right side up so that operations can be easily performed under the instrument.



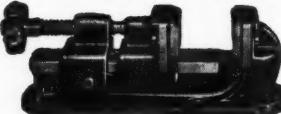
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Instant .001" adjustment #1900 Micrometer Stop limits depth of Co-sinks and Co-bores. Assures flushness. $\frac{1}{4}$ " Shank for drill press or hand drill. Cuts metals or plastics. Micrometer Stop \$7.25; HSS Cutters— $\frac{7}{16}$ " dia. \$1.75, $\frac{5}{8}$ " dia. \$2.35. Specify incl. angle and pilot. Folder free.

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Spencer Stereoscopic
Shop Microscope

The optical system with converging objectives, achromatically corrected, clearly shows length, width, and depth, with enhanced perspective. The two eyepieces of the microscope are mounted according to the normal convergence of the eyes for close work and are adjustable, thus permitting the use of the instrument for long periods of time without eyestrain. Their design allows the operator to wear safety goggles.

Supplied in powers of 9X, 18X, and 27X, the Spencer Stereoscopic Shop Microscope has a glass plate clipped to the front of the objective holder to prevent oil and metal chips from damaging the lens surfaces. Designed for complete flexibility, the instrument can be used conven-

ally or bolted to a machine through a hole provided in the base. It may also be attached to specially designed brackets on machines. Cabinets are supplied with all models.

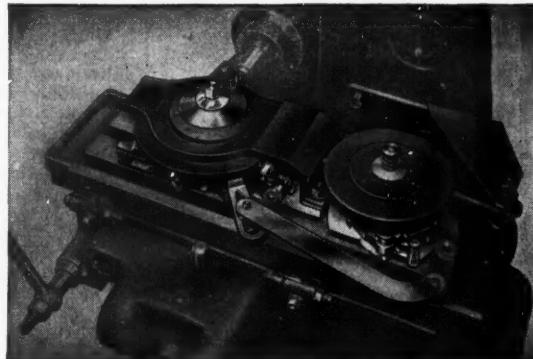
Portman Model T-1 Hydraulic Variable Speed Transmission

A small size hydraulic variable speed transmission designated as the Model T-1 has been announced by the Portman Machine Tool Co., 70 Portman Rd., New Rochelle, N. Y. The transmission provides infinitely variable speeds from zero or neutral to full electric drive motor speed in either direction (forward or reverse). This extremely wide range of speeds in either direction, combined with a full neutral position, is said to make the transmission ideally suited for innumerable machinery drive applications.

The Portman Model T-1 Transmission is of the multiple piston constant torque type and has a rating up to one horsepower maximum and an output torque of 52½ inch-pounds maximum. The transmission is an entirely self-contained unit and does not require any separate oil sump or reservoir tank.

MAXIMUM PRODUCTION IN CHUCKING AND INDEXING

With the new Dearborn Automatic Indexer connected to a Dearborn Chucking Fixture: chuck is closed automatically; indexed the required number of times automatically; chuck is opened automatically; piece is knocked out automatically.

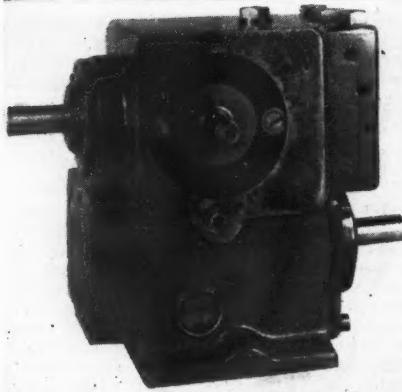


Write for further
information.

When used with the Dearborn Degree Indexing Fixture it can quickly be set to index any number of degrees from 30° to 90° at one indexing and then knock out, or it can be set to index from no degrees to 90° and then not knock out.

J. W. DEARBORN

• Ansonia, Conn.

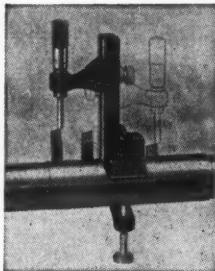


Portman Model T-1 Hydraulic Variable Speed Transmission

The Model T-1 transmission may be furnished with various types of speed controls, including handwheel or lever controls, as well as remote controls. The transmission is 9½ inches high, 11 inches long overall, including input and output shaft lengths, and 7 inches wide, with ¾-inch diameter shafts.

SAVE TIME

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Bartelt
Gages



- Use a Bartelt Pedestal Micrometer for setting boring tools and for many other shop operations requiring accurate positioning relative to a fixed base. Make settings in one step—eliminate cut-and-try methods. Model B, with reversible slide, shown. Write for literature describing all models.

BARTELT ENGINEERING CO.

1216 PARTRIDGE AVE.
BELOIT • WISCONSIN

Gusher Model 11029 Coolant Pump

An immersed type coolant pump designated as the Gusher Model 11029 has been placed on the market by The Ruthman Machinery Co., 1817 Reading Rd., Cincinnati 2, Ohio. The pump motor, which is a totally-enclosed type, is equipped with an upper end bell having a large built-in conduit box with ample capacity to accommodate the multiple lead wires of dual voltage stators. The through bolts fasten from inside the upper end bell, thereby improving the streamline appearance and the drip-proof construction.

Large precision sealed prelubricated ball bearings are used, thus eliminating the need for oilers or grease fittings. Twin inlets within the pump are so arranged as to provide for hydrodynamic balance, thereby eliminating end thrust on the shaft. All rotating parts are dynamically balanced by an electronic process to ensure quiet operation and long life.

According to the manufacturer, the Gusher Model 11029 Coolant Pump can be used to handle liquids containing reasonable amounts of grit and abrasives since there are no metal-to-metal contacts within the submerged portion. The capacity of the pump at 26-foot-head is 50 g.p.m. with a ½ h.p. motor and 60 g.p.m. with a ¼ h.p. motor.



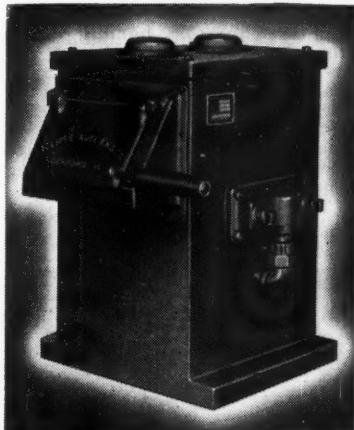
Gusher Model 11029
Coolant Pump

Eclipse Model 1-B Bench Type Oven Furnace

Designated as the Model 1-B, a completely redesigned and improved bench type oven furnace for use in small tool and other heat-treating shops is announced by the Eclipse Fuel Engineering Co., 754 S. Main St., Rockford, Ill. The furnace shell is of heavy gauge welded sheet with reinforcements to provide a rigid

furnace structure. Heavy cast sections are used at all points subjected to heat, such as door, door frame, top casting, and flue outlets. The entire unit is streamlined and fully enclosed to protect parts against damage and also to prevent workmen from coming in contact with any of the electrical or mechanical parts.

Primarily designed for use where low pressure air (from 10 to 16 oz.) is available, combustion equipment includes a burner and McKee proportional mixer which provides for single valve temperature control. The temperature range is from 1,400 to 1,600 deg. F. The Model 1-B furnace is said to require very little



Eclipse Model 1-B Bench Type Oven Furnace

floor and bench space and is supplied completely assembled. To use, the gas supply is connected and the cord from the motor attached to the nearest electric outlet.

The Eclipse Model 1-B Bench Type Oven Furnace is said to be especially suitable for intermittent use in hardening punches, dies, and small tools or brazing applications in shops where space is limited.

West Point Automatic Cam Clamp

An improved automatic cam clamp in which the operation of the handle automatically advances or retracts the clamp strap to or from the work is an-

*Buy
KIPP AIR GRINDERS
Because*

The RPM's stay up while grinding...not only when the grinder runs idle.

It is an established fact that surface speeds must stay up to approximately a mile a minute if you want to grind—not just rub. The speed of Kipp air grinders drops but slightly when put to work. That means better work—longer wheel life.

Buy Kipp air tools for best results, lower prices.

MODEL JA
50,000 R.P.M.

\$3.25

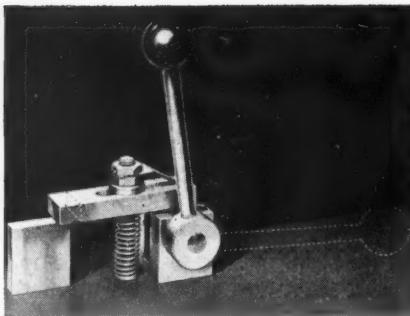
IN U.S.A.



Weight 12 ounces;
length 6 3/4 inches;
chuck size 1/8 inch.
Wheel guard re-
moved for better
illustration.

MADISON-KIPP CORP.
208 Waubesa St., Madison, Wis., U.S.A.

- Skilled in DIE CASTING Mechanics
- Experienced in LUBRICATION Engineering
- Originators of Really High Speed AIR TOOLS



West Point Automatic Cam Clamp

nounced by the West Point Manufacturing Co., 19625 Merriman Ct., Farmington, Mich. An outstanding feature of the clamp is a built-in rest block which makes the clamp a complete unit that can be easily attached to a fixture by drilling three holes.

An advantage of the West Point Automatic Cam Clamp is the fact that the handle can be mounted in any position for right or left-hand operation. The long ball knob handle permits unusual leverage for holding the work firmly.

The West Point Automatic Cam Clamp is sturdily made of alloy steel and cadmium plated. The strap, cam, and pin, are heat treated. Spherical washers with ground radii are used to compensate for irregularities in the work. The clamp can be easily adapted for operation by an air cylinder.

Hobart No. 12 Electrode

Identified as the No. 12, a heavy coated electrode which is designed for d.c.



GRAY TURRET HEAD METAL CUTTER OR NIBBLER

N.A.M. Pioneer Award
Given to Gray

Most modern Nibblers for Template Cutting, Tool Rooms, Shipbuilding, Aircraft Parts, Aircraft Tubing, Sheet & Plate Shops.

GRAY MACHINE CO.
Box 596, Philadelphia, Pa.

straight polarity or a.c. at unusually high current ratings to increase welding speed on poor fit-up work has been announced by the Hobart Brothers Co., Hobart Sq., Troy, Ohio. At high currents, the spatter loss of the electrode is said to be unusually low, with a minimum tendency of the electrode to stick when welding with a close arc.

The Hobart No. 12 Electrode is available in $\frac{1}{8}$, $\frac{3}{16}$, $\frac{5}{32}$, $\frac{1}{16}$, and $\frac{3}{8}$ -inch diameters.

M-B Model S-VT "Spee-Dee" Pneumatic Polisher

Engineered for easy handling, a lightweight (14-oz.) pneumatic polisher for use with abrasive rolls and pencils, as well as bands, and so on, is now being marketed by M-B Products, 130 E. Larued St., Detroit 26, Mich. Designated as the Model S-VT "Spee-Dee," the tool has a speed of 18,000 r.p.m. and includes an air control lever for starting and stop-

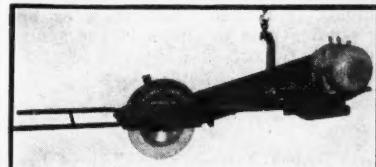


M-B S-VT "Spee-Dee" Pneumatic Polisher

ping. An adjusting screw provided controls the valve that regulates the speed of the spindle for varying air pressures.

The spindle is of heavy construction and is made of special alloy steel which is heat treated and ground to close limits. The spindle operates on special grease-sealed type bearings that require no manual or automatic lubrication, and is designed to accommodate mandrels $\frac{1}{4}$

MUMMERT-DIXON SWING FRAME GRINDERS



Sizes 12", 14", 16", 18", 20" and 24" wheels.

Ask for Descriptive Circular

M U M M E R T - D I X O N C O .
120 Philadelphia St. • Hanover, Pa.

inch in diameter. A collet having an outside diameter of $\frac{1}{4}$ inch and inside diameter of $\frac{1}{8}$ inch is available for use in the spindle.

The M-B Model S-VT Spee-Dee Pneumatic Polisher is furnished complete with a hose line 7 feet long fitted with a dirt filter; two drop-forged wrenches; one $\frac{1}{4}$ -inch mandrel; and two abrasive rolls. If desired, the tool can also be used with high speed rotary files for many applications.

Van Keuren No. M 21 Microgage Set

The Van Keuren Co., 176 Waltham St., Watertown, Mass., is now introducing a set of Microgages which is designed for setting large micrometers. Designated as the No. M 21, the set includes 1, 2, 3, 4, 5, and 6-inch Microgages which are $\frac{1}{8}$ inch in diameter. The 1-inch Microgage is held within a tolerance of plus 12 millionths and minus 8 millionths of an inch, a total tolerance of 20 millionths of an inch. The 2, 3, 4, 5, and 6-inch Microgages are held within a total tolerance of 15 millionths of an inch per inch of gage length.

According to the manufacturer, the



Van Keuren No. M 21 Microgage Set

$\frac{1}{8}$ -inch diameter provides proper rigidity for the long gages and also a large surface area which greatly assists in holding the long combinations together. The $\frac{1}{8}$ -inch diameter gage body comprises a ground true cylinder, with the end surfaces held square with the body within close limits.



Order Them Together

STITES CAMS AND TOOLS for Screw Machine Products

One source of supply and responsibility for your Brown & Sharpe cams and circular form tools is a definite advantage.

This is available at the Stites Tool Company where years of experience assures quality, accuracy and prompt service.

Here's one more priceless ingredient—Personal Service. Ask any Stites customer or better yet, try it yourself.



THE STITES TOOL CO.

1426 W. THIRD STREET • CLEVELAND 13, OHIO

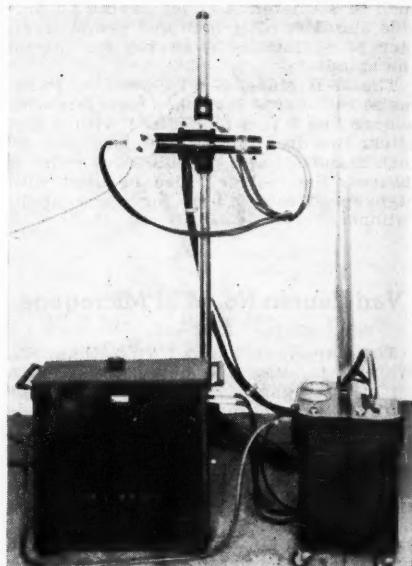
The Van Keuren No. M 21 Microgage Set is designed to produce combinations up to 21 inches and include a mahogany case for containing the various gages.

St. John X-Ray Back-Reflection Unit

An X-ray back-reflection unit that can be used in field, shop and/or laboratory work is announced by the St. John X-Ray Laboratory, Clifton, N. J. The unit is said to be particularly suitable for stress analysis, such as in determining residual stresses in welded plates on board ship or checking for possible fatigue cracks in bridges and other structures.

The equipment consists essentially of three parts: (1) generator with meters and controls, (2) pump for circulating and cooling water, and (3) X-ray tube mounted on a flexible tube stand. The unit is described as self-rectified and shockproof and the tube as ray-proof. For work on steel, it is equipped with a cobalt target.

The back-reflection camera is mounted to the tube window. The circular film holder is oscillated during the exposure by a small motor also mounted on the



St. John X-Ray Back-Reflection Unit

Micro Supreme
LAY-OUT AND IDENTIFICATION DYE

12 COLORS*

For Tool, Die, Pattern or Template layout on metal . . . Quick identification of stock and parts . . . Shows up in sharp relief—dries instantly—easily removed... Write for circular.

*Purple shipped unless otherwise specified

MICHIGAN CHROME & CHEMICAL COMPANY
6340 E. Jefferson Ave. • Detroit 7, Mich.

tube base. A unique advantage of this arrangement is that the X-ray beam falls through the center of the film onto the object, from which it is reflected back to the film where it registers a pattern. This pattern serves to calculate existing stresses.

According to the manufacturer, the St. John X-Ray Back-Reflection Unit is portable and comparatively simple to use, yet highly accurate.

P&H A.C. Arc Welder with "Dial-lecetric" Current Control

The Harnischfeger Corp., Welding Division, 4400 W. National Ave., Milwaukee 14, Wis., announces the addition to its line of P&H welding and materials handling equipment of an a.c. arc welder featuring a simplified current control, designated as the "Dial-lecetric," which is said to completely eliminate the need for moving coils or cores, worm gears, sprockets, and chain or lever attachments. Current selection is made simply by turning a single dial which is said to require only a three-quarter turn to cover the full welding range of the machine from mini-

mum to maximum capacity. The Dial-electric control is claimed to make starting of the arc easy and instantaneous and to eliminate the need for added or auxiliary current boosters.

All industrial models of the P&H A.C. Arc Welder are designed for remote control by means of a removable control dial which provides a current amperage adjustment at the job for manual or automatic welding. An additional feature of the welder is the high-low welding range. The Dial-electric control dial is designed



P&H A.C. Arc Welder with "Dial-electric" Current Control

to indicate two separate ranges, a high range for general-purpose welding and another range for light-gauge welding. The welder is offered in intermittent industrial and heavy duty models ranging up to 625 amperes.

Miller 4-Piston Hydraulic Pump

Said to operate in either direction of rotation without further modification, a 4-piston hydraulic pump weighing 30 lb. and designed for easy installation is an-

BUTTERFIELD THRED-RITE DIES

The modern adjustable collet die at its best.

Engineered to meet the demand for screw thread parts production on high speed equipment.



These dies can be used not only in our own Floating and Releasing Type Holders but also in any Holder designed for dies of this type.

For accuracy, speed and long life specify Thred-Rite.

UNION TWIST DRILL CO. BUTTERFIELD DIVISION

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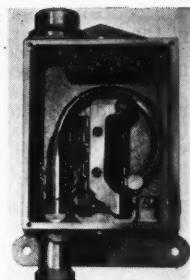
Miller 4-Piston
Hydraulic Pump

nounced by The Miller Hydraulic Engineering and Sales, 3615 Hart, Detroit 14, Mich. The four pistons in the pump mechanism are horizontally opposed. Hardened steel throws are keyed to the drive shaft. The sturdy one-piece forged bronze

connecting rods have ball ends which accommodate the pumping load on the inside of the piston dome. Relief valves incorporated in the pump are set at the factory to the desired pressure.

At 1,200 r.p.m., the discharge pressure of the Miller 4-Piston Hydraulic Pump ranges from 0 to 3,000 p.s.i. and the delivery from 5.4 to 3.0 r.p.m. The four cylinders provide a discharge flow that is said to have a minimum of pulsation. The discharge pressure is claimed to be practically independent of the drive speed. Horsepower input is nominal.

pressure types, each adjustable over a wide range, the Meletron Model 310 Pressure-Operated Switch incorporates an Underwriters' Laboratories approved snap-action Micro switch, and features a uniform housing dimension for all switch types regardless of their operating range. Constructed so as to allow for extremely easy adjustment of the pressure setting, the unit presents an explosive-proof design for hazardous installations and is available in several combinations of switching and adjusting arrangements, depending upon the service required.



Meletron Model 310
Pressure-Operated
Switch

Meletron Model 310 Pressure-Operated Switch

Intended for use as a control mechanism in chemical processing, petroleum processing, heating, air conditioning, pneumatic and hydraulic systems, machine tools, aircraft, and so on, a pressure-operated switch designated as the Model 310 is now being marketed by the Meletron Corp., 950 N. Highland Ave., Los Angeles 38, Calif. A Bourdon tube pressure response element permits adjustments to be made with comparable pressure gage accuracy and dependability.

Available in low, medium, and high

Homer Permanent Magnetic Pulley

As an addition to its line of permanent magnetic tramp metal separators, The Homer Manufacturing Co., Dept. I-36, Lima, Ohio, announces a permanent magnetic pulley which is designed for use as a head pulley in belt conveyor systems to remove ferrous metal particles and pieces from materials being conveyed. The pulley is made of cast aluminum and steel and is available in all standard diameters above 10 inches and in widths that are multiples of 6 inches.

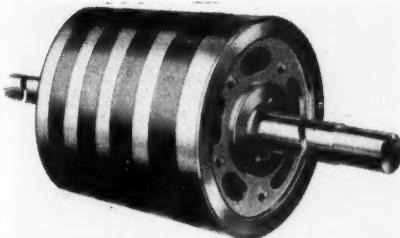
According to the manufacturer, only the most powerful of magnets is used in the manufacture of the Homer Permanent Magnetic Pulley to assure thorough

This **PALMGREEN**
No. 000 ANGLE VISE for
Milling, Drilling, Grinding, Etc.
Solve Difficult Angle Jobs.
Get QUICK, ACCURATE,
SET-UPS and save time,
money, rejects. Accurately
machined and graduated
to full 90°. Also use
horizontal. Steel Jaws
2½" plain or grooved.

Combination—Can't Be Beat!
No. 83 ROTARY TABLE
With Dual Cross Feeds
For Drill Press, Lathe or Milling Machine. Combines Indexing, Milling and Rotary Table. Accurate and speedy—strong and sturdy. Rotary Feed calibrated in degrees, cross feed in thousandths. Low price. Get facts.

Immediate Delivery—Write for Circular 351
CHICAGO TOOL AND ENGINEERING CO.
8399 S. Chicago Ave. Chicago 17, Ill. Phone-Saginaw 9675

A black and white photograph showing two industrial tools. On the left is a Palmgreen No. 000 Angle Vise, which has a large base and a vertical column with a swivel jaw. On the right is a No. 83 Rotary Table, which is a circular device with a central motor and a rotating worktable.



Homer Permanent Magnetic Pulley

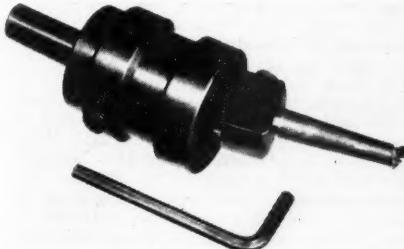
cleaning of materials passing over the pulley. To dissipate any heat created by belt slippage or friction, the pulley is amply ventilated.

P & P Adjustable Boring Tool

An adjustable boring tool designed for use in hand and automatic screw machines, high speed milling heads, and automatic boring machines is announced by the Pump & Products Co., 6715 Detroit Ave., Cleveland 2, Ohio. According to the manufacturer, the tool is compact, sturdy, easily adjusted, and positive locking. All parts are hardened to provide for maximum wear.

The P & P Adjustable Boring Tool can be used in boring holes up to $1\frac{1}{2}$ inches in diameter and has a body $1\frac{1}{8}$ inches in diameter $\times 2\frac{1}{8}$ inches long. The tool is designed to accommodate a $\frac{3}{8}$ -inch diameter boring bar and is available with either a $\frac{1}{2}$ -inch diameter $\times 1\frac{1}{8}$ -inch long or 1-inch diameter $\times 2\frac{1}{8}$ -inch long straight shank. It is supplied complete with one high speed steel boring bar and one adjusting key.

P & P Adjustable Boring Tool



M-B MODEL UTR
60,000 RPM

"UTILITY" Pneumatic
GRINDER

A powerful, fast-cutting tool, streamlined in design, easy to handle. Designed for real production work and the toughest jobs. Precision made, excellent balance. Special grease-sealed bearings . . . no lubrication required. Fitted with steel housing, a special safety feature.

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M-B PRODUCTS
130-134 E. LARNED ST.
DETROIT 26, MICHIGAN

CAMMONS REAMERS

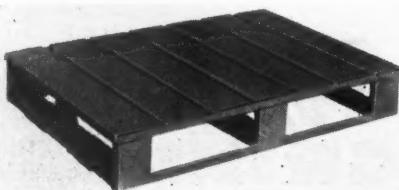
Manufacturers of

- The Cammons Helical Taper Pin Reamer
- The Cammons Helical Chucking Reamer
- The Cammons Helical Die Makers Reamer
- The Cammons Duplex Taper Pin Reamer
- Special reaming problems invited

THE GAMMONS-HOAGLUND CO.
MANCHESTER CONNECTICUT

Palmer-Shile All-Metal Four-Way Pallet

A single-face all-metal four-way pallet constructed of special corrugated rolled steel and welded throughout for rigidity



Palmer-Shile All-Metal Four-Way Pallet

and endurance has been announced by the Palmer-Shile Co., 16022 Fullerton Ave., Detroit 27, Mich. Designed for use with power lift and hand trucks, the unit is built with beveled edges on two sides to permit trucks to ride over easily. If desired, the pallet can be obtained with a special rolled channel steel face having a center brace for extra weight loads.

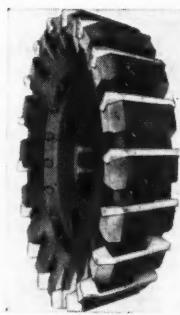
The Palmer-Shile All-Metal Four-Way Pallet can be obtained in any gauge, size,

or weight capacity to meet the specific manufacturing requirements or can be designed to user specifications.

Kennametal Axial Face Kennamill

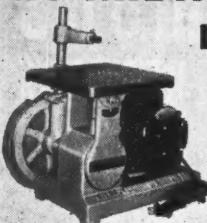
Designed especially for the production milling of cast iron and suitable for light to medium cuts on solid or cored castings, the Kennametal Axial Face Kennamill illustrated herewith, product of Kennametal Inc., Latrobe, Pa., incorporates blades that can be assembled to within a few thousandths of an inch on the face and periphery and do not move during tightening, it is claimed. Cutter life between grinds is said to be unusually long due to the rigid solid blade construction. Sharpening is claimed to be simplified because of the open construction of the cutter and freedom from brazing strains, as well as the fact that there are only three surfaces to grind.

The Kennametal Axial Face Kennamill can be mounted on all ordinary spindles, with bolt circle provided to order. The body is shaped to permit grinding a 45-deg. corner angle for milling light cored sections, and is sufficiently over nominal diameter to cut full width when so ground. The cutter is available in five sizes of 6, 8, 10, 12, and 14 inches.



Kennametal Axial Face Kennamill

The MILWAUKEE DIE FILER



Cuts Costs
on Filing,
Sawing and
Lapping

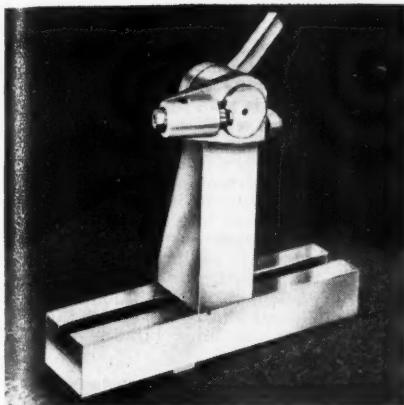
An efficient, bench-type machine, used for straight line, sharp corner, flat surface filing, sawing and lapping. Permits instant removal and checking of work-piece. Supplements work of The MILWAUKEE PROFILE GRINDER.

Write for Bulletins on Both Machines.

Milwaukee
CHAPLET & MANUFACTURING CO.
1041 S. 40th ST., MILWAUKEE 4, WIS.

Erickson Tru-Matic Wheel Dresser

To meet the need for an improved method of dressing grinding wheels repeatedly on the same setup without losing time in resetting the wheel to the work, the Erickson Tools Div., 2309 Hamilton Ave., Cleveland 14, Ohio, has developed the Erickson Tru-Matic Wheel Dresser illustrated herewith. Designed for universal grinders, the dresser does not need to be removed in order to use the machine on which it is installed. An easy movement of the locking lever per-



Erickson Tru-Matic Wheel Dresser

mits the diamond to be turned back out of the way. The diamond holder incorporates a precision collet which permits the diamond to be turned in any position to take full advantage of all the cutting points.

Sturdily and ruggedly constructed for constant use, the Erickson Tru-Matic Wheel Dresser is made of high grade steel, correctly hardened and ground. The weight of the unit is 17 pounds.

Lyon-Raymond Lightweight Hydraulic Foot Pump

The accompanying illustration shows a lightweight hydraulic foot pump which has been introduced by the Lyon-Raymond Corp., 3874 Madison St., Greene, N.Y. The pump is so constructed that the pedal return spring is located inside the pump body and the release controlled by slightly raising the single pump pedal. The total weight of the pump is $13\frac{1}{4}$ lbs.

According to the manufacturer, working pressures up to 1,500 p.s.i. can be obtained with the Lyon - Raymond Lightweight Foot Pump. The usable oil capacity is 15 cubic inches, the oil being contained in a sealed reservoir requiring no vent, thus allowing the pump to be mounted in offset positions if desired. The flat base of the unit includes three bolt holes for easy pump mounting. Additional features of the unit include a built-in

ROGERS PATENT ADJUSTABLE HOLLOW MILLING TOOL

Quickly and easily adjusted—rugged in construction—rigidly locked when on the job.

Carbide tipped blades optional, are quickly interchanged with the high speed steel blades, for cutting the harder or gritty materials.

The Rogers 61 years experience in Special Tool Design is always available to your firm.

Write for catalog

**THE JOHN M. ROGERS
TOOL CORP.**

Gloucester City

New Jersey

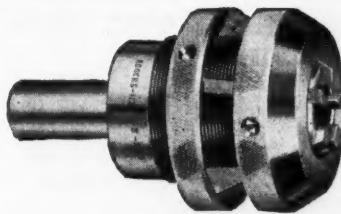
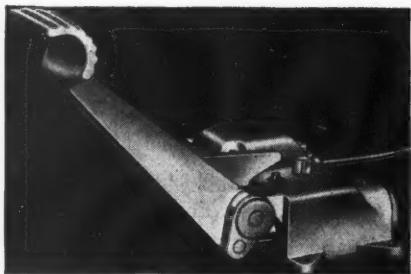


Fig. 20—Shank Integral



Fig. 23—Arbor Separate



Lyon-Ramond Lightweight Hydraulic Foot Pump

oil strainer, adjustable relief valve, and chrome-plated piston for smooth long-life operation.

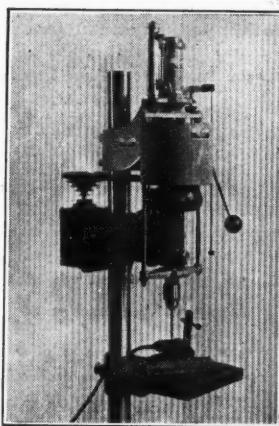
Nilcamp Drill Press Feed

An air-operated feed which is constructed to fit all popular makes of drill presses and tapping machines is now being marketed under the trade name of Nilcamp by Sanderen Sales Service, New Haven, Conn. Without the use of gears,

racks, or pinions, air power is transmitted directly to the chuck.

The Nilcamp Drill Press Feed is designed to convert a hand-operated drilling or tapping machine into a fully automatic one. Air power is said to eliminate operator fatigue, and a hydraulic check is said to assure uniform strokes. The feed is available in several models, operated by either hand, solenoid, or automatic return. The air cylinder is interchangeable so that for difficult jobs a larger cylinder may be substituted.

Accurate depth limits are said to be easily obtained with the attachment, as well as a considerable reduction of broken tools. The feed can be used for tapping or threading normally binding metals.



Nilcamp Drill Press Feed

such as aluminum, zinc, or die castings, since stripping of threads is said to be avoided by speed controls regulating the advance or return feed independently of each other.

ARTUS PLASTIC SHIM



AND
FEELER
GAUGE
STOCK

The COLOR
tells the
THICKNESS

Each thickness a distinctive, easy to identify color. Impervious to oil. Long lasting. 5"x20" sheets. Special sizes to order. Handy assortment, shim stock, 12 colors—12 thicknesses (.001-.030). Bound together. \$4.25.

Order today. Immediate delivery.

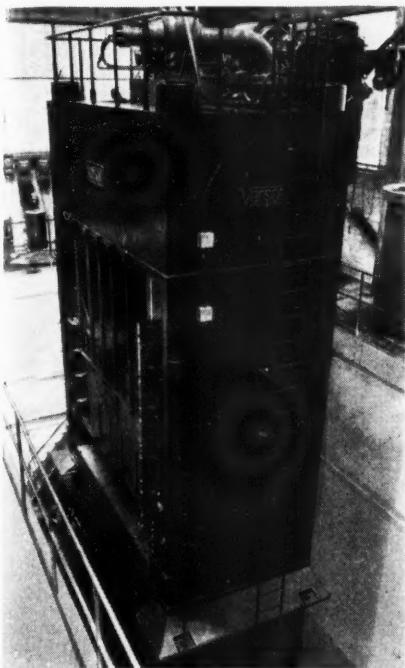
INDUSTRIAL PRODUCTS SUPPLIERS
434 Broadway, Dept. M, New York 13, N. Y.

Verson 1,500-Ton Hydraulic Press

Introduction of a 1,500-ton straight side hydraulic press especially designed for use in the forming of heavy parts is announced by the Verson Allsteel Press Co., 9301 S. Kenwood Ave., Chicago 19, Ill. Standing 38 feet high, the press measures over 19 feet in length and 10 feet in width. The stroke is 48 inches, with 88 $\frac{1}{2}$ inches of daylight provided. The bed

area is 96 x 144 inches, and the total weight of the press is approximately 500,000 pounds.

From an engineering standpoint, the Verson 1,500-Ton Hydraulic Press features fast advance to the work with automatic shift to full pressure stroke, thereby eliminating high speed impact. Reversal is automatic on pressure or distance. Full electrical push-button con-

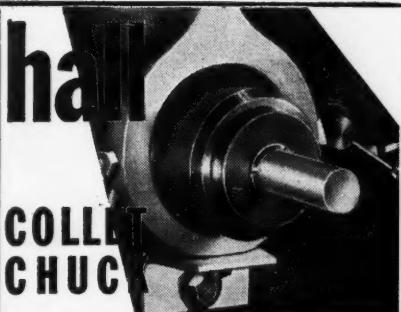


Verson 1,500-Ton Hydraulic Press

trol is provided for automatic operation of the machine, with control stations for four operators incorporated in the design.

Garrison Improved Drawbar-Type Gear Chuck

The Garrison Machine Works, Inc., 515-25 Bannock St., Dayton 4, Ohio, announces an improved drawbar-type gear chuck for locating bevel gears by the pitch line of the teeth while grinding a



SPEED UP production in multiple operations with push-out type Hall Collet Chuck. Full spindle capacity or over. Tremendous grip over or under stock size to .007—without adjustments...no bearings, friction, heat or loss of power. Instant release without stopping lathe.

Two-inch capacity, now only \$145
One-inch capacity, \$95.
Round, square or hex collets, plain—serrated
HALL MANUFACTURING COMPANY
622 Tularosa Drive • Los Angeles 26, Calif.

MARVECO LIVE CENTERS

- HIGH SPEED
- LONG LIFE
- HEAVY DUTY



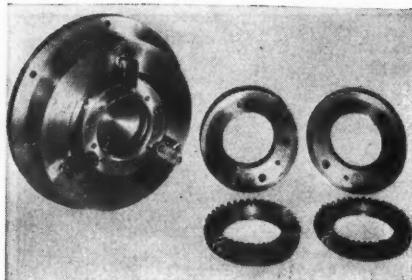
MARVECO - guaranteed to outperform and outlast any other live center. Write for free catalog, "The Marvels of Marveco."

SEND US
YOUR CENTER



PROBLEMS

MARVEL TOOL & MACHINE CO.
3401 E. McNichols Road, Detroit 12, Mich.



Garrison Improved Drawbar-Type Gear Chuck with extra interchangeable locating rings for handling different gears

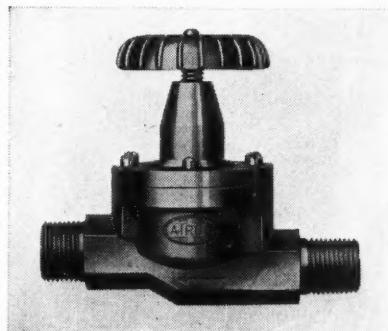
bore and a portion of the back face at one chucking. The chuck is drawbar operated yet adaptable to different machines without the necessity of providing a properly threaded connector, since the operating mechanism is not attached or connected directly to the drawbar. The unit can be operated by a machine hand lever, air cylinder, or other means.

Different gears can be handled in the same chuck through the use of extra bevel-

el interchangeable locating rings of the type shown in the illustration. The chuck is available in various sizes for accommodating a wide variety of gears.

Airco $\frac{1}{2}$ -Inch Station Outlet Valve

Product of Air Reduction Sales Co., 60 E. 42nd St., New York 17, N. Y., the Airco $\frac{1}{2}$ -Inch Station Outlet Valve illustrated herewith is described as a compact combined shutoff and check valve for use on drops or risers of a piping system. The valve is a diaphragm type and performs a dual function. As a shutoff valve, it permits repairs or alterations to be made on equipment downstream from the valve without disturbing other stations on the line. As a check valve, it allows the flow



Airco $\frac{1}{2}$ -Inch Station Outlet Valve

of gas in only one direction and is arranged to close tightly in the event a disturbance at the torch causes a back pressure to travel as far as the valve.

The body, bonnet, and handwheel of the Airco $\frac{1}{2}$ -Inch Station Outlet Valve are brass forgings. Several outlets can be connected to one service drop, each outlet being entirely independent of the other. Moreover, the valve can be dismantled and reassembled easily and quickly.

SIMPLE — FAST — ACCURATE LOCATING



SIMPLE

Place instrument in spindle of boring mill (vertical or horizontal), drill press or jig borer.

FAST

200 - 1000 r. p. m. Bring thumb nail to bear against centering bead until it runs true. Stop machine and focus on work. Keep eye at least 4 inches from viewing aperture.

ACCURATE

Locate cross lines on work to match lines in viewing aperture.

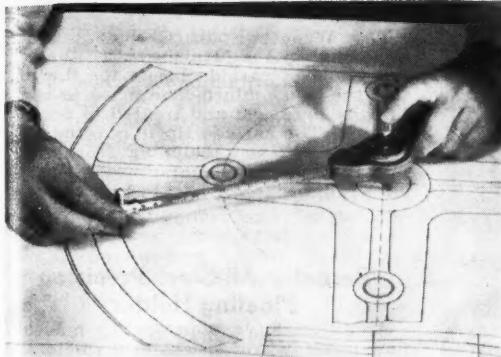
Write for catalogue No. 12

CENTER SCOPE PRODUCTS

3829 San Fernando Rd., Glendale 4, Calif.

Omicron Beam Compass

Intended for architectural and engineering drawing, as well as for sheet metal layout and woodworking, a beam compass featuring unusual compactness



Omicron Beam Compass

ible scale of the Omicron Beam Compass and the efficient method of reading adjustments reduce errors to a minimum. A unique lever firmly locks the tape in any desired adjustment, and the tape may be moved only when the lever is depressed. An outstanding feature of the compass is the accurately machined head which is designed to hold a standard drafting pencil lead or a steel scribe. It may also be used to hold a common lead pencil.

and rapid, efficient radius setting has been placed on the market by The Omicron Co., 532 W. Windsor Rd., Glendale 4, Calif. Applying the principle of the flexible-rigid type of retractable steel tape, the compass may be used with radius settings up to 72 inches. The tape is arranged to retract into a small rugged die-cast case that may be easily held in the palm of the hand.

According to the manufacturer, the leg-

Brown Rotary Base Two-Way Sliding Table

A two-way sliding table featuring a rotary base graduated to 360 deg. is now being marketed by the Leo G. Brown Engineering Co., 1127 Riverside Dr., Los Angeles 31, Calif. The table has a $7\frac{1}{4}$ x $7\frac{1}{2}$ -inch top surface which is mounted on two screw-equipped slide-ways with 6-inch travel set at 90 deg. with each other.

CARBOLOY TIPPED SCRAPER BLADES

Especially good for hard alloy iron and extremely hard bronze castings. If you are using Anderson Hand Scrapers it is not necessary to buy complete new scrapers in order to use carboloy tipped blades. Simply remove high-speed blade and slip in the Anderson Carboloy Tipped Blade. Available in three widths.



by *Anderson*

THEY LAST 8 TO 10
TIMES LONGER

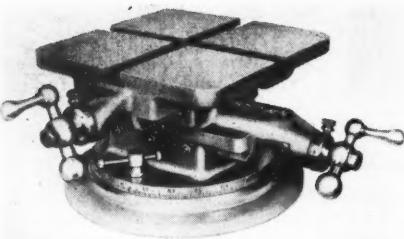


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ANDERSON BROS. MFG. CO., Rockford, Ill.

See Our Catalog in Sweet's

Hand and Power Hydraulic Presses, Balancing Ways, Roto Checkers, Hand and Power Scrapers, Spotters.



Brown Rotary Base Two-Way Sliding Table

Two clamping screws in the base can be used to firmly lock the table at any angle.

The Brown Rotary Base Two-Way Sliding Table measures 4 1/4 inches high overall and weighs 35 pounds.

Wendt-Sonis Carbide-Tipped Grooving Tool

A carbide-tipped tool for producing grooving has been developed by the Wendt-Sonis Co., Hannibal, Mo. The tool



Wendt-Sonis Carbide-Tipped Grooving Tool

is designed for machining A, B, and C belt size pulleys. The nose width and angle are said to be held to close tolerances

10 Models
WRITE FOR CATALOG

FLYNN

OFFSET
BORING HEADS

3/8" to 1 1/2" bar capacity. 1/2" to 12" diameter holes. Built-in micrometer offset.

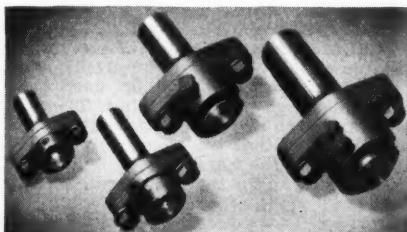
FLYNN MFG. CO.
437 BATES ST. • DETROIT 26, MICH.

for the accurate production of the finished pulley.

The Wendt - Sonis Carbide - Tipped Grooving Tool is furnished with the proper grade of carbide insert for the material to be machined. The shank is scientifically hardened and treated to prevent rusting. The carbide tip is covered with plastic to prevent chipping from handling. The tool is manufactured in shank sizes ranging from 5/8 x 1 to 1 inch square.

Barnaby All-Steel Precision Floating Holder

An all-steel precision floating holder is now being offered in shank diameters of 5/8, 3/4, 1, and 1 1/4 inches by the Barnaby



Barnaby All-Steel Precision Floating Holder

Manufacturing and Tool Co., 70 Knowlton St., Bridgeport 8, Conn. The holder is designed to provide a ready means for aligning drills, reamers, and similar tools with the work.

The cutting tool is held in the head of the holder either directly or by means of a bushing, and is clamped by a hardened steel set screw. One Barnaby hinged-shoe bushing blank is furnished with the holder.

DRILL THESE HOLES
BY A QUICK, EASY, INEXPENSIVE METHOD
Your business letterhead will bring literature.
WATTS BROS. TOOL WORKS
Wilmerding, Pa.

Furnas "A" Series 1 H.P. Motor Controller

Designated as the "A" Series, a 1 h.p. motor controller designed for medium industrial or workshop equipment is now being marketed by the Furnas Electric Co., 443 McKee St., Batavia, Ill. The unit is available in four switching arrangements; namely, reversing, two-speed, series-parallel, and three-pole on-off.

The Furnas A Series Controller includes a plastic case, handle, and contact rotor. An outstanding feature of the unit is its versatility of mounting. Several



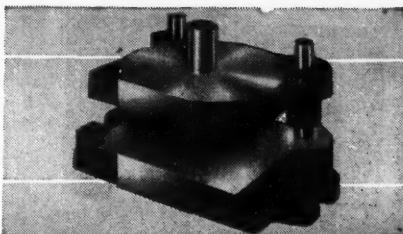
Furnas "A" Series 1 H.P. Motor Controller

mounting arrangements are available such as an angle bracket, flange mounting plates, and plates for attachment to several styles of standard outlet boxes.

Atrax $\frac{1}{4}$ -Inch Carbide Bur

A $\frac{1}{4}$ -inch carbide bur having a $\frac{1}{8}$ -inch heat-treated steel shank for use in high speed portable tools has been brought out by The Atrax Co., Francis Ave. and Day St., Newington 11, Conn. According to the manufacturer, the large size of the bur provides for unusual strength and long life and permits fast operation on heavy duty jobs.

The Atrax $\frac{1}{4}$ -Inch Carbide Bur is ma-



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HIGH SPEED STEEL**



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MORE THAN 100
STYLES and SIZES
AVAILABLE



SPECIAL KNURLS

made to blue print
or specifications.

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REED ROLLED THREAD DIE CO.

Formerly ROLLED THREAD DIE CO. and REED SMALLFOOT WORKS

Knurls - Thread Rolling Dies and Machines
WORCESTER 2, MASSACHUSETTS, U. S. A.



Set of Nine Atrax 1/4-Inch Carbide Burs

chine ground to an exact predetermined design. The helix, rake, depth of flute, fillet, and finish are said to be precisely controlled. The bur is available in nine different shapes, packaged in an attractive birch or maple box for safekeeping and to protect the cutting edges.

WIREGRID

ARMSTRONG-BRAY

WIREGRID precision made Belt Hooks come with extra (patented) blue aligning cards—are held more rigid, assuring perfect alignment of hooks —less hook loss from handling — a better job when applied with any make lacing machine. 6 sizes.

STEELGRID Flexible Lacing, applied with a hammer, clinches over and protects end of belt. Makes strong, flexible joints. Boxed with 2-piece hinged rocker pins or can be obtained in long lengths for conveyor belt use.

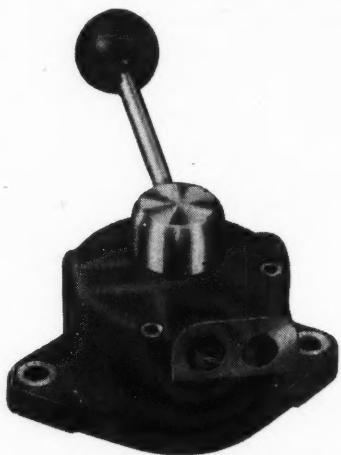
ARMSTRONG-BRAY & CO.
The Belt Lacing People
1346 Northwest Hwy., Chicago, Ill.

STEELGRID

Knox "Air-Miser" Four-Way Air Valve

A four-way air valve to be known as the "Air-Miser" is now being produced by Knox Industries, Inc., 5548 N. Main St., Lexington, Mich. The valve is designed with a by-pass port in the bronze disc which allows half of the compressed air used in the power stroke of a double-acting air cylinder to be used to return the piston. The valve by-passes the air used on the power stroke of the cylinder to the opposite end of the cylinder through an accumulator which stores 50 per cent of the exhausted air and utilizes that air to return the piston to starting position, thus reducing the load and volume consumed from the air compressor by 50 per cent.

The Air-Miser Valve has an auxiliary port which can be used should more air be required to return the piston. The valve also has a neutral position which

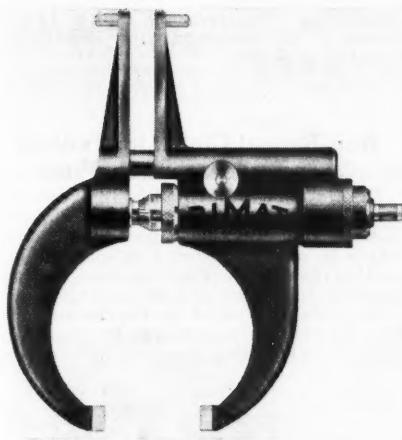


Knox "Air-Miser" Four-Way Air Valve

is used when the cylinder is idle, thereby effecting additional savings in compressed air.

"Rimat" Duplex Micrometer

Internal and external measurements can be made with a single tool, known as the "Rimat" Duplex Micrometer, now be-



"Rimat" Duplex Micrometer

ing produced by the Rimat Machine Tool Co., 124 S. Isabel St., Glendale 5, Calif. The micrometer is made in three standard sizes of 0-1 inch, 1-2 inches, and 2-3

inches. However, special sizes are available upon order.

A companion tool to the Rimat Inside Micrometer recently announced, the Rimat Duplex is made of high quality materials. The ends of the measuring pins are hardened and ground on a radius for accuracy and to prevent cramping. All wearing surfaces are hardened and ground and can be readily adjusted if necessary. Graduations are designed for easy reading.

0

Palmer-Shile Heavy Duty Die Truck

A heavy duty die truck announced by the Palmer-Shile Co., 16022 Fullerton Ave., Detroit 27, Mich., is especially designed for high production shops and factories where heavy dies, stampings, forgings, jigs, or fixtures are continually moved from one location to another. Roller conveyors can be placed on the bed of the truck to facilitate materials handling.

Made of heavy special fabricated steel plate securely welded throughout, the

*We'll stake our reputation on
STANDARD Adjustable MULTIPLE SPINDLE
DRILL HEADS*

Low Prices • Top Quality • These Heads can
be adapted on either round or
flanged quill machines.

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UNITED STATES DRILL HEAD CO.

CINCINNATI 4, OHIO



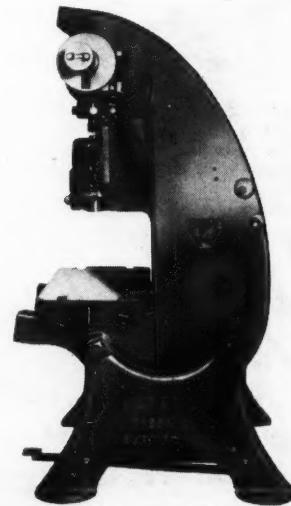
Palmer-Shile Heavy Duty Die Truck

truck features a fifth wheel or caster type construction utilizing Timken thrust bearings. The truck is furnished with rubber-tired or metal wheels equipped with Timken taper roller bearings, and can be obtained in any size or capacity to meet the most exacting man-

ufacturing requirements. The truck shown in the accompanying illustration is rated at 8 tons.

Non-Repeat Clutch for Federal Open Back Inclinable Press

For its open back inclinable press, the Federal Press Co., Elkhart, Ind., announces a non-repeat clutch mechanism which is said to ensure single-stroke operation regardless of how quickly the foot pedal is depressed or how long the operator holds the pedal in depressed position. The clutch is arranged for easy tripping, thus reducing operator fatigue to a



Federal Open Back Inclinable Press Equipped with Non-Repeat Clutch

minimum, and is claimed to provide for positive stroke control.

With the clutch mechanism, the operator need not move from his working position or use any tools to adjust the machine from single to automatic cycle, or reverse. His only action is to give the positive control bolt a one-quarter turn. The non-repeat clutch provides one complete cycle and stop before the press can be retipped in single cycle action. Down-stroke repeats and accidents caused by

**LET US
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YOUR BASES!**

Save high cost of molds and castings. Littleford bases of plate or sheet steel are lighter, easier to change in design, accurate in construction. We know how! State your needs!

LITTLEFORD

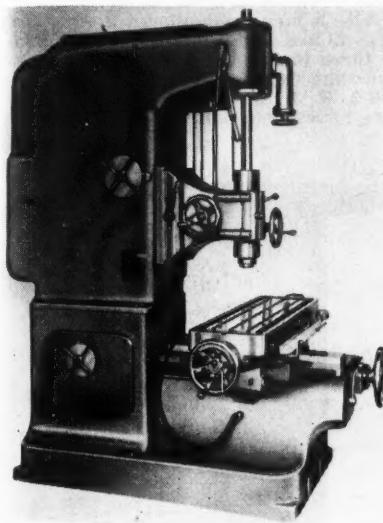
LITTLEFORD BROS., INC.
433 E. Pearl St., Cincinnati 2, Ohio

the crank passing its cycle center are said to be prevented.

The non-repeat clutch is available on all Federal presses from 60 to 80 tons.

Knight No. 50 Precision Boring and Vertical Milling Machine

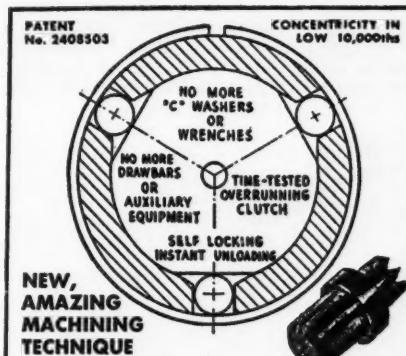
Designated as the No. 50, a combination precision boring and vertical milling machine which is designed to make operation extremely simple even though the unit is adaptable to a wide range of work



Knight No. 50 Precision Boring and Vertical Milling Machine

has been introduced by the W. B. Knight Machinery Co., 3920 W. Pine Blvd., St. Louis 8, Mo. According to the manufacturer, the machine offers unusual speeds and power for rapid metal removal. The entire base is a rugged one-piece semi-steel casting to provide the rigidity required for precision work.

The Knight No. 50 Precision Boring and Vertical Milling Machine has 16 spindle speeds ranging from 40 to 2,000 r.p.m. and 9 spindle feeds of from 0.005 to 0.010 inch. The unit features a table traverse in both directions of 100 inches per minute and 16 table feeds of from $\frac{1}{16}$ to 20 inches per minute. It is equipped with a $7\frac{1}{2}$ h.p. drive.



YOUNG PRECISION EXPANDING MANDRELS FOR PRODUCTION OR INSPECTION

Curtiss-Wright Corporation ranks our product with their best tools. Cleveland Graphite Bronze Company, leading bearing manufacturer, states new high accuracy reached, plus substantial production boosts.

ROUGHLY SKETCH DESIRED MANDREL INTO YOUR PART PRINT AND FORWARD FOR QUOTES.

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3237 BRADFORD RD., CLEVELAND HTS. 18, OHIO

MEINHARDT

DIAMOND TRIPED DRESSING TOOLS

Fine Industrial Diamonds
Set by The Process

Assure Longer Life

Cut Cleaner Faster

Any Type Counting

Gems of Industry

MEINHARDT DIAMOND TOOL CO.
2810 Milwaukee Ave. Chicago 18, Ill.

Wolverine Safety Tongs

A safety tongs with finger guard for extra protection and fast work handling is now being manufactured by the



Wolverine Safety Tongs

Wolverine Tool Co., 1480 E. Woodbridge, Detroit 7, Mich. The guard on the tongs is so placed that it offers a protected point of leverage for the index finger and thus not only provides for maximum safety but also efficient direction control for positive, fast work handling.

The Wolverine Safety Tongs is recom-

mended for use in handling material on punch presses or other operations where the hand requires protection. The tongs is made of drop-forged steel and is very light in weight and sturdily constructed. The long, thin, soft iron nose is said to prevent die breakage, and the black oxide finish on the tongs is claimed to be corrosion resistant.

Eisler Air-Cooled Dry Type Transformer

An air-cooled dry type transformer with weatherproof enclosure for outdoor service is now being offered in sizes from 15 to 75 kva and in single or three phase or three to two phases by the Eisler Engineering Co., Inc., 740 S. 13th St., Newark 3, N. J. All exposed leads and bushings have been eliminated and provision



Eisler Air-Cooled Dry Type Transformer

has been made for lead entrance through conduit knockouts in the all welded steel case. Floor mounting is standard, however, wall mounting can be provided when required.

The transformer is available for every industrial power or distribution application within its rating, and may be supplied in any voltage combinations 2,400 volts and below for any commercial power frequency.

Deep Hole DRILLING

Send us prints of your parts requiring deep holes for an estimate on drilling only or furnishing parts complete.

We are especially equipped to drill deep holes from $3/16$ to $1\frac{1}{2}$ inch diameters up to 12 feet deep.

**CONNER
TOOL & CUTTER COMPANY**

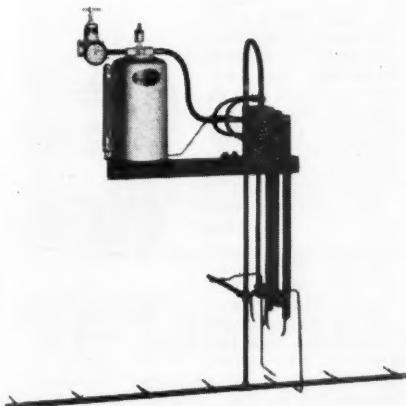
(DEEP-DRILLING DIVISION)

1000 East McNichols Road, Detroit 3, Mich.

Fauver Conveyor Lubricator

The J. N. Fauver Co., 49 W. Hancock Detroit 1, Mich., announces the development of a lubrication system for conveyors operating through high temperature zones. The lubricator illustrated herewith is designed specifically for use in a large automobile plant foundry on core-oven chains operating on a 24-hour basis in a temperature up to 550 deg. Fahrenheit.

The unit is mounted on top of a 6-inch I-beam which carries conveyor wheels and is arranged to automatically lubricate the wheel bearing from each side of the two wheels above each hanger. The unit is also equipped with a manifold containing 11 nozzles that lubricate all



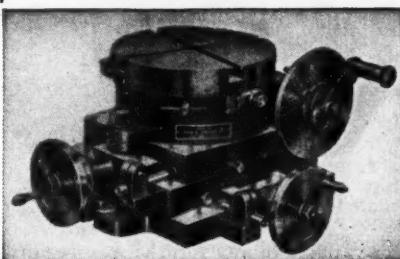
Fauver Conveyor Lubricator

link pins between the hanger trolleys each trip. Each set of wheels is 88 inches apart, and the conveyor travels at a speed of 2 feet per minute.

"Coni-Cutter" Welding Tip Dresser

The Conical Tool Co., 423 Division S., Grand Rapids 3, Mich., announces the addition to its line of "Coni-Cutters" of a tool for dressing or pointing up burned or deformed welding tips in electric spot welders without removing the tip from the machine. When used in connection with any one of the many air or electric-operated hand tools now on the market, the tool is said to automatically recut and form the proper tip shape required.

No. 1 COMPOUND TABLE With 7½" Dial Type Rotary Table Mounted

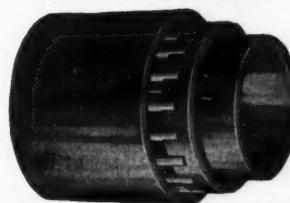


We also make a No. 2 Size for 12" Rotary Table. Can be had without
Rotary Table.
Write for Bulletin.
Rotary Tables • Multiple Spindle Index Centers • Vises • Screw Machines •
Screw Head Slotters.

John B. Stevens Inc.

482 Canal St. New York 13, N. Y.

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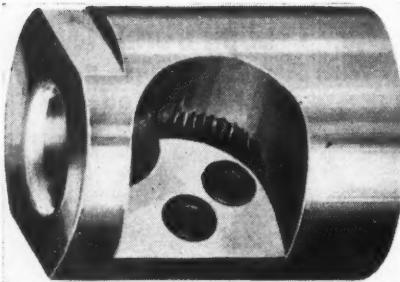
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thrust bearings.

THE GWILLIAM CO.

358 FURMAN STREET

BROOKLYN 2, N. Y.



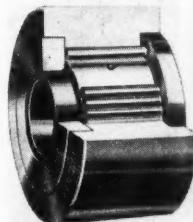
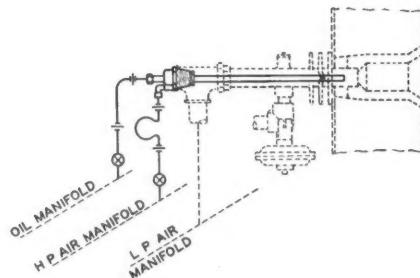
"Coni-Cutter" Welding Tip Dresser

Available in any form or size required, the Coni-Cutter Welding Tip Dresser can be simply and easily resharpened.

"Surface" Oil Standby Equipment

The Surface Combustion Corp., Toledo 1, Ohio, announces the availability of oil standby equipment for use with most of

"Surface" Oil Standby Equipment



McGill "Multirol"
Cam Yoke Roller
Bearing

its gas burner equipment. The oil standby equipment utilizes No. 3 furnace oil or lighter and is said to provide the same B.T.U. input per hour as is provided with the gas burner equipment.

Once installed, "Surface" Oil Standby Equipment can be quickly changed over during periods of gas curtailment.

McGill "Multirol" Cam Yoke Roller Bearing

The McGill Manufacturing Co., Inc., Valparaiso, Ind., announces the addition of a cam yoke roller bearing to its line of "Multirol" bearings. This cam follower type bearing is made with an inner race to increase adaptability where mounting by the conventional cam follower stud is undesirable, and is available in shaft sizes ranging from 0.250 to 1.250 inch.

The internal construction of the cam yoke roller bearing is similar to the Multirol cam follower, having an extra heavy outer race section and a full complement of small diameter rounded end rollers. The full usable length of the rollers provides for maximum load carrying capacity which, in conjunction with the sturdy roller end plates permanently fastened to the inner ring shoulders, is said to assure a bearing unit capable of rugged service and precision performance.

12"

DRILLS!
12" LONG

(FROM $\frac{1}{8}$ " TO $\frac{1}{2}$ "—BY $1/64$ 'S INCLUSIVE)

HIGH SPEED STRAIGHT SHANK DRILLS
9-Inch Flute
Immediate Delivery

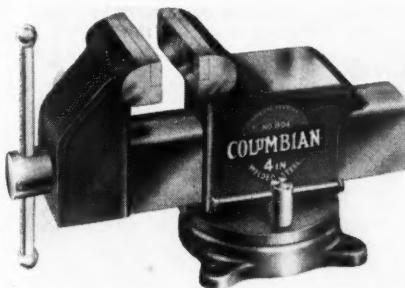
Eastern Tool Supply Co., Inc.
176 Grand St., New York 9, N. Y.

FREE COPY

MACHINE SHOP CATALOG—125 page fully illustrated catalog describes a large variety of drills, reamers, cutting and lathe tools, vises, etc.

Columbian No. 804 Workshop Vise

Designated as the No. 804, an all-purpose bench type vise of all-steel construction and fabricated by arc welding



Columbian No. 804 Workshop Vise

is now being manufactured by the Columbian Vise and Manufacturing Co., 9021 Bessemer Ave., Cleveland 4, Ohio. The front and rear jaws of the unit are arc welded from heavy steel, and the replaceable steel jaw faces are heat treat-

ed. The screw and handle are of forged steel, and the swivel base is of steel construction. The standard malleable iron is replaceable.

The Columbian No. 804 Workshop Vise is furnished in bright red, has a 4-inch jaw width and 5-inch jaw opening, and weighs 20 lb. The shipping weight of a wooden case containing six vises individually boxed is approximately 150 pounds.

Kato Totally-Enclosed Three-Phase Motor

A totally-enclosed three-phase motor is now being produced in sizes of 1½, 2, and 3 h.p. by the Kato Engineering Co., Mankato, Minn. The squirrel cage rotor makes use of rolled sheet copper bars to assure uniformity and low internal rotor resistance, and is equipped with Norma-Hoffmann grease sealed cartridge type bearings. Stator windings are completely submerged in high grade varnish, and each winding is twice baked at a moderate temperature until the varnish is properly cured.

Holes in the mounting feet of the Kato Totally-Enclosed Three-Phase Motor are

Put Your Stop Watch →on NICHOLSON EXPANDING MANDRELS

Test the time-saving possibilities of these widely used precision tools. Not infrequently, time studies show operations are completed in less time than was formerly consumed in looking for or turning a solid



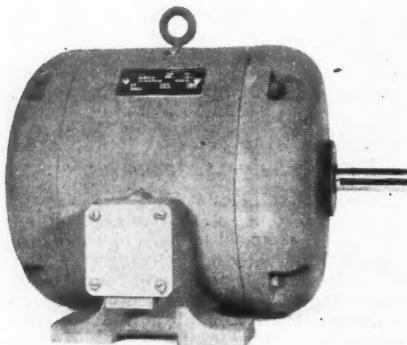
BULLETIN 1043 SHOWS YOU HOW TO
Save Set-up Time . Promote Precision

arbor. Set of 14 does work of 209 solid arbors. For all bores $\frac{1}{2}$ " to 7". Hardened tool steel. Sold singly or in sets.

W. H. NICHOLSON & CO., 136 Oregon St., Wilkes-Barre, Pa.

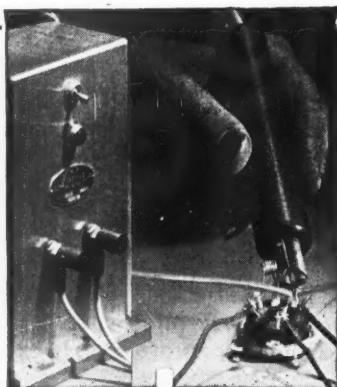
Valves . Traps . Floats . Steam Specialties

spaced in accordance with N.E.M.A. A special cast iron outlet box threaded for the proper size of conduit is mounted on



Kato Totally-Enclosed Three-Phase Motor

the side of the motor. The frame and end bells are of cast iron and incorporate a lifting ring.



FOR FASTER, SAFER SOLDERING

The Luma resistance method of soldering is the accepted way for small shops requiring single operation to large plants with many types of operations. Write for complete information about this remarkable tool.

LUMA ELECTRIC EQUIPMENT CO.
P. O. Box 132-M.S. Toledo 1, Ohio

Torit Polishing and Buffing Wheel Hood

To meet the need for an efficient hood for collecting dust from polishing and buffing wheels, the Torit Manufacturing Co., 296 Walnut St., St. Paul 2, Minn., has developed a hood of the design illustrated herewith. The hood is built in several different sizes, according to wheel diameter. The arrangement and location of the exhaust outlet are such that a smooth flow of dust-laden air from polishing and buffing wheels into the piping to the dust collector is said to be assured.

Made of 16 gauge steel to provide for long service, the Torit Polishing and Buffing Wheel Hood is designed for a 39-inch spindle height and is available in the following sizes: No. 8-A (5 inches wide) for 8-inch diameter wheels; No. 10-A (6 inches wide) for 10-inch diameter wheels; No. 12-A (6 inches wide) for 12-inch diameter wheels; No. 14-A (6 inches wide) for 14-inch diameter wheels; and No. 16-A (7 inches wide) for 16-inch diameter wheels. *

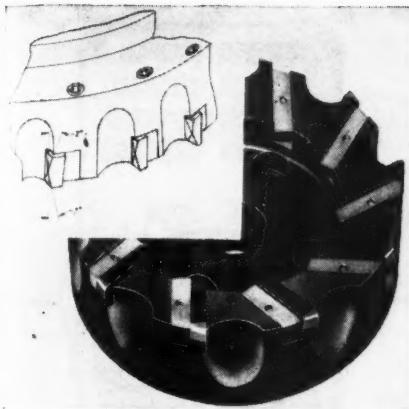


Torit Polishing and
Buffing Wheel Hood

Super "Bi-Axial" Milling Cutter Grind

An improved "Bi-Axial" grind for making heavy side and face milling cuts with solid carbide insert blade cutters has been developed by the Super Tool Co., 21650 Hoover Rd., Detroit 13, Michigan.

The combination of negative radial and two negative axial rake angles have a "centering" effect on the cutter, thereby stabilizing the pressure and eliminating chatter, it is claimed. As a result, a high quality finish and unusually long cutter



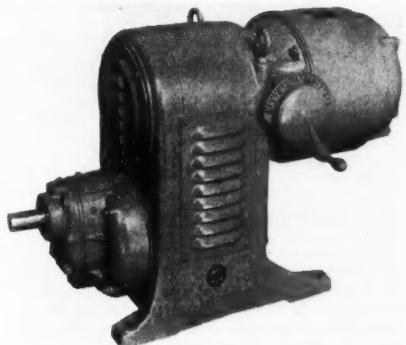
Solid Carbide Insert Blade Milling Cutter with
Super "Bi-Axial" Grind

life are said to be obtained. Moreover, the design of the Bi-Axial grind provides for an extremely high rate of production with a minimum of cutter sharpenings.

U. S. Size 23 Varidrive Motor

Incorporating features and advantages that are said to provide for unusually small size for a given horsepower, long belt life, convenient positioning of the speed adjusting handwheel, and easy changing of Varibelts, a variable speed motor designated as the U. S. Size 23 Varidrive is announced by U. S. Elec-

U. S. Size 23 Varidrive Motor



Whitney-Woodruff TYPE KEYS

**Lower Production Costs and Provide
Greater Ease of Assembly**



Check These Advantages

- ✓ Eliminate skilled labor in key-seat cutting and key-fitting operations.
 - ✓ Flat key bottom and starting radius on the edges simplify assembly.
 - ✓ Key reaches deep into shaft and is firmly imbedded, enabling it to withstand greater strain.
 - ✓ Greater resistance to shaft fracture due to shape of key seat and permanent key fit.
- Made in American standard sizes and Whitney standard sizes for special application.
Available from Whitney Distributors throughout the country. Or write:

**WHITNEY CHAIN & MFG. CO.
HARTFORD 2, CONN.**



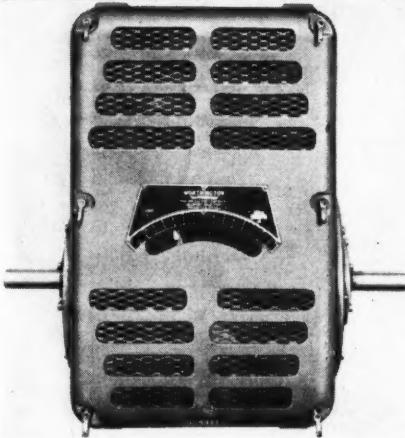
trical Motors, Inc., Milford, Connecticut.

A wide variety of assemblies is available to suit practically any application, such as horizontal frame with shaft left or right, upright frame with shaft high or low, and built-in speed reducers of single and double reduction. Speed variations of 2 to 1 to 7 to 1 are obtainable with up to 5 h.p. output.

Worthington 5 and 7½ H.P. Variable Speed Control Reduction Units

The Atlantic Gear Works, 200 Lafayette St., New York 12, N. Y., announces the addition to its line of Worthington variable speed control reduction units of a 5 and 7½ h.p. size with an 8-to-1 ratio. The construction of each unit is such that variable speed changes can be easily obtained either by a hand lever, worm gear drive, or fully automatic.

The Worthington Variable Speed Control Reduction Units are claimed to be particularly useful in chemical laboratory, wire drawing, and other operations



Worthington Variable Speed Control Reduction Unit

where speed must be gradually increased or decreased to avoid destruction of the product.

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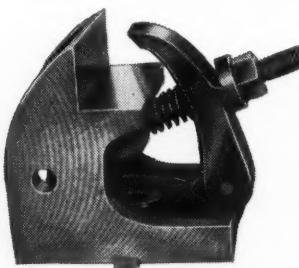


The Dahlstrom Tap Guide practically eliminates tap breakage, and turns out uniform work. Just fasten it to a post or bench, slip a Tap Adaptor into the spindle, and turn the handle. Equipped with 7 Adaptors from 8-32 to 1/2" (taps not furnished). Literature on request. Dahlstrom Mfg. Co., 418 S. Sixth St., Minneapolis 15, Minn.

Dahlstrom TAP GUIDE

Hart Improved Milling Fixture

An improved milling fixture which is designed to firmly hold any shape stock—round, hexagonal, octagonal, or square—



Hart Improved Milling Fixture

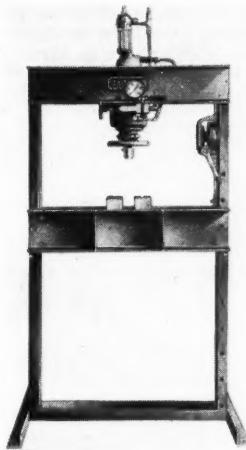
in position for easy machining, automatically aligning the stock with the machine, is now being produced by the Hart Machine Co., 28 Mather St., Dorchester, Mass. The fixture may be set up

in a horizontal or vertical position, the grip holding the work on the bottom as well as on the back.

The Hart Improved Milling Fixture is made in four sizes for holding stock from $\frac{1}{2}$ to 5 inches, and is supplied in pairs unless otherwise specified.

Dake Air-Operated Press

An air-operated press for garage, tool and die shops, or manufacturing plants has been announced by the Dake Engine Co., Grand Haven, Mich. The press is said to offer unusual ease and speed of operation since all force is provided by



Dake Air-Operated Press

the air pressure and only two simple valves need be manipulated by the operator in order to obtain the desired pressure.

The Dake Air-Operated Press is available with either of two style pumps, one of which provides the rated tonnage of the press at 145 lb. air pressure and the other at 90 lb. air pressure. The machine is equipped with a special safety valve to prevent overloading of the equipment regardless of the air pressure. If desired, an optional air pressure control is available which can be regulated to provide any desired air pressure lower than line pressure.

The Dake Air-Operated Press is available in 25, 50, and 75-ton capacities.

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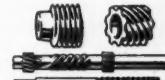
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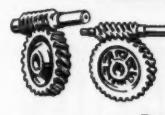
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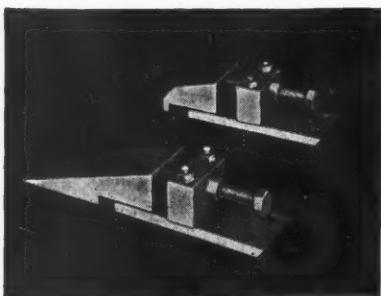
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Bridgeport Table Jack

An adjustable table jack for use in machine shops is now being manufactured under the trade name of Bridgeport by



Bridgeport Table Jacks

the Hardware Sales Co., 1969 North Ave., Bridgeport 4, Conn. Adjustable for height and for angles, the jack is designed to eliminate the use of shims and can be locked to maintain setups as desired.

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Sturdily and durably constructed, the Bridgeport Table Jack is said to be precision aligning and is made in three sizes; namely, 100A for lifting up to 500 lb., 100B for lifting up to 4,000 lb., and 100C for lifting over 4,000 pounds.

Miller Pump and Hydraulic Ram

The accompanying illustration shows a simple and efficient pump and hydraulic ram announced by Miller Hydraulic Engineering and Sales, 3615 Hart, Detroit 14, Mich. The unit is single acting and manually operated. The pump is small and sturdily constructed and is said to require a minimum of space for installation and operation. The control valve has a positive action and permits lowering at any desired speed regardless of the position of the operating handle, it is claimed.

The ram is available in three standard sizes having lifting capacities from 2,210 to 8,885 lb. (based on 5,000 p.s.i.). Hydraul-



Miller Pump and Hydraulic Ram

lic rams can, however, be furnished with any length stroke, type of bottom, and top of plunger to meet all requirements.

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New Books

How to Operate Under the New Labor Law. Published by the Labor Relations Institute, 1776 Broadway, New York 19, N. Y. Price, \$2.00.

The effect of the new Labor-Management Relations (Taft-Hartley) Act upon employers, unions, and employees is set forth in practical terms in this timely report. More than an analysis of the new law governing employer-employee relations, the report views the new statutes against the background of the Wagner Act—now largely superseded—and measures its effect in states which have even more restrictive state laws. It explains in exactly what ways management's position is improved and strengthened and what individual rights previously denied to workers can now be exercised by the latter. The report sets forth the new limitations placed on unions and outlines the added powers accruing to Government under the new law.

The authors of the report point out that the most important things for employers to know are the answers to the following questions: What may you do now that heretofore you were restrained or prevented from doing? What must you

do now? What must unions do now? What may individual employees do now? They answer the questions by listing 17 things that employers now are permitted to do; 11 that they must do; 9 actions that unions are required to take, and 10 new freedoms for employees, including the right to petition the NLRB for decertification of the union.

These specific pointers on the law are supplemented by a highly informative question-and-answer breakdown, section-by-section, of the Act. In all, 83 such questions are raised and answered, giving the citation for each reply and comparing it with the pertinent provision, if any, in the old law.

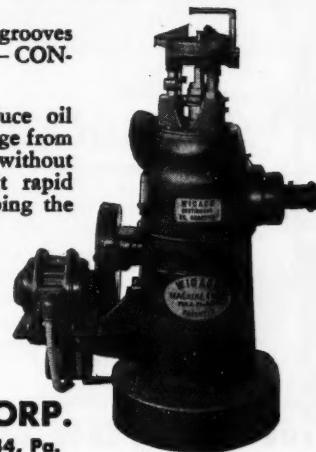
The analysis of state regulations, presented in chart form in the manual, should prove equally helpful to employers, especially those with plants in one or more of the states affected. Pointing out that the new Act permits state law to govern in all instances where the latter are more restrictive with respect to union security than the federal statute, the authors go on to list the states which regulate the following: union security, check-off of dues, strike votes and strikes in public utilities, and the registration of unions.

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Another helpful feature is an item-by-item comparison of the Wagner Act and the Taft-Hartley Act, telling how each stands in relation to 21 key matters, including NLRB, certification of unions, unfair labor practices, reinstatement and back pay, individual bargaining, "free speech," secret ballots, closed shop and union shop, check-off, termination of contracts, union liability, union regulation, Communist leadership, injunctions and restraining orders, rules of evidence, statute of limitations, foremen, health and welfare funds, craft versus industrial units, and national emergencies. The manual closes with an excerpted text of the new law.

Materials Handbook. 6th edition. By George S. Brady. Published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18, N. Y. Cloth binding, board covers. Price \$7.00.

The first edition of "Materials Handbook" was published in 1929. It grew out of the author's need for a quick reference to basic data on all kinds of industrial materials when he was an American Trade Commissioner. It began with an intensive study of the materials of each

industry and a card index of comparative data.

Accumulated data were based on the ready-reference information needed in preliminary discussions of purchasing requirements. Later, when the author was managing editor of two industrial trade papers, and then a consulting engineer, the collection and classification of data were extended to cover the primary requirements of industrial executives, designers, architects, and builders of mechanical equipment and plants. Still later, when he was chief materials consultant to the Office of Civilian Supply and to the Board of Economic Warfare, the scope was extended to include in the book the chief materials entering into international trade because of the widened interest in all world materials throughout American industry brought about by the war.

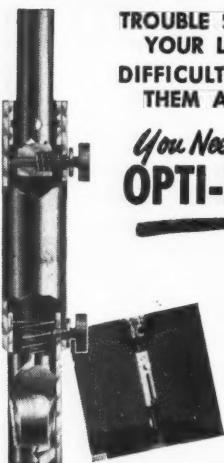
It is not the author's intention to provide an exhaustive treatise on any material, as it is assumed that purchasers and designers will consult producers of the materials for detailed specifications. General information, with the most commonly used comparative figures, is given on materials in their group classifications in order to provide a general picture; patented and trade-named materials are then described to afford a more specific understanding of commercial applications. The relative position and the length of description of proprietary materials are for the purpose of illustration and bear no relation to the relative merits of the products of any one producer. Some processed industrial materials have been included for more intelligent judgment of the basic raw materials and because these materials are the raw materials in some industries.

Part II of the book also represents a development from a need. It began as an appendix containing such tables as are frequently required for reference. In this edition, it developed into an arrangement

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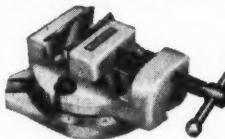


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of basic economic data because the experience of the author in dealing with procurement officials in Federal and military service has paralleled that of the National Association of Purchasing Agents; namely, that the materials' procurement function is a profession drawing on all the technical sciences, and that the procurement official no longer is content merely with the administrative "how" of buying, but wants basic technical facts on the "why" in simple usable terms.

Industries Answeright. By Charles Z. Smith, Sr. Published by Genalflash Co., 105 Grove Ave., Albany 3, N. Y. 440 pages, 8½ x 11 inches. 215 illustrations. Leather cloth binding, board covers printed with genuine gold leaf. Price, \$6.00 postpaid.

Intended for both the experienced mechanic and the student fresh out of school, this volume includes hundreds of fully illustrated practical problems taken directly from machine shops, engineering and production departments. Comprehensive outlines are provided for systematically determining dimensions for standard and special thread gages. In addition, dimensions for several thousand

plug and ring gages are provided in tabular form, to assist the mechanical engineer, inspector, or designer in checking or specifying gages.

Detail drawings of thread plug gages, thread ring gages, and interlocking and staggered tooth cutters are shown. These drawings can be used as a guide for similar designs. A unique slide rule digit system is explained in detail, with examples included. This system for placing the decimal point is said to be especially helpful for those using a slide rule to check their work.

The author has also included in the book eight-decimal-place tables of the natural trigonometric functions to every minute. The functions read in one direction for the full 90 deg., with every number printed out in full. These tables are desirable for work that requires precision measurements. Examples showing how to interpolate precede these tables. Tables are included for converting hundredths of a millimeter to inches and hundredths of an inch to millimeters. A table is also provided for converting a decimal part of a degree directly into minutes and seconds or in the reverse order.

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drawings with the unnecessary dimensions omitted. Among the many problems solved are: roll and ball measurements for checking dimensions; location of radii for jig boring dimensions; bevel gear, check face angle or sine bar; corrected tool steps on circular and flat form tools; spiral wound covering for cylinders; dimensions for laying out developed surface of cone; location of set block for dovetail mill; check compound angle with ball dimension; radii for convex and concave flat form tools; and rotating and tilting angle for compound angle vise.

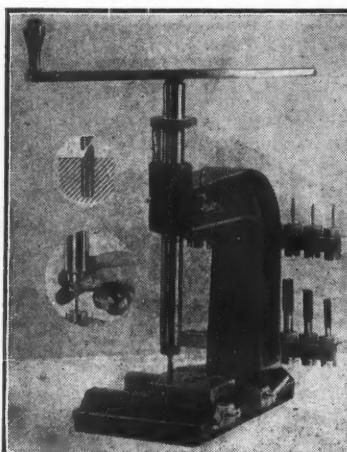
Compressed Air Handbook. First Edition. Published by Compressed Air and Gas Institute, 90 West St., New York, N.Y. 400 pages, 6 x 9 inches. 247 illustrations, including photographs and drawings. Stiff-backed simulated leather cover, gold embossed. Price postpaid anywhere in the United States, \$3.00 per copy; elsewhere, \$3.50.

This volume has been published to meet widespread demands for a reference text on applications, installation, operation, and maintenance of compressing

equipment and air-powered tools of all types. In addition to making available a considerable amount of new and original data, the handbook contains, in revised and improved form, all of the standard reference material formerly published as "Trade Standards." Included are definitions, test standards, and numerous basic tables and formulas.

The aim in editing "Compressed Air Handbook" was to provide a comprehensive volume of reference data which would meet technical and engineering needs and, at the same time, serve the layman and student with information on the wide versatility, flexibility, and utility of modern compressed air power. The handbook represents the collective knowledge, experience, and thought of the 19 member companies of the Compressed Air and Gas Institute and was compiled over a two-year period as a joint activity of the Institute's educational and technical committees.

"Compressed Air Handbook" is divided into five chapters, each of which contains numerous sub-divisions. Chapter I includes 62 pages and 59 illustrations and is headed "Typical Applications of Compressed Air and Gas." Chapter II contains 38 pages and 44 illustrations and is entitled "Representative Types of Compressor Installations." Eighty-nine pages and 106 illustrations comprise Chapter III, "Portable Air-Operated Tools and Rock Drills." Chapter IV, "Engineering the Compressor Installation for Maximum Efficiency," includes 51 pages and 19 illustrations and is divided into two principal sections as follows: Section I, Planning, Selecting and Installing the Compressed Air Plant; Section II, Compressor Engineering Installation and Maintenance Data. The fifth and final chapter of the handbook is entitled "Compressed Air Engineering Data and Test Procedure" and contains 114 pages and 19 illustrations.



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Practical Emulsions. Revised and enlarged edition. By H. Bennett. Published by Chemical Publishing Co., Inc., 26 Court St., Brooklyn 2, N. Y. 568 pages. Cloth binding, board covers. Price, \$8.50.

This completely revised and enlarged edition features a symposium on industrial emulsions which covers the use of emulsions in dyeing and coloring, polishes, paints, and so on. The most recently developed emulsion formulas have been added to the formula section.

The author, who is a technical director of one of the leading manufacturers of emulsifying agents and emulsions, has included data and methods from his own broad experience along with selected passages from the works of other experts. The book touches only lightly on the theoretical aspects and concentrates on the art of making and applying emulsions. The comprehensive list of emulsifying agents should be of particular value to chemists, manufacturers, students, and others in practically all fields of research and industry.

The contents of the book are divided into two principal parts; namely, General and Formulas: Under Part I, the following topics are covered: Emulsifying Agents; Types of Emulsions and Foams; Methods, Formulation; Equip-

ment; Stability; General Technical Emulsions; Emulsions in Leather Manufacturing; Synthetic Rubber Latex; Industrial Wax Emulsions; Emulsion Paints; Cosmetic Emulsions; Dye Emulsions; Dispersing Agents, Wetting Agents; List of Emulsions; and Demulsifying and Defoaming Agents.

Part II deals with the following subjects: Agricultural Spray Emulsions; Cutting Oils, Soluble Oils, Miscible Oils; Emulsifying Agents; Bituminous Emulsions; Cleaners and Soaps; Cosmetic and Drug Emulsions; Defoaming Agents; Food Emulsions; Gasoline Emulsions; Lacquer Emulsions; Medical Emulsions; Paint Emulsions; Paper Processing Emulsions; Polish Emulsions; Resin and Rubber Emulsions; Textile Emulsions; Waterproofing Emulsions; Wax Emulsions; Miscellaneous; and Dispersions.

Production Handbook. By L. P. Alford and J. R. Bangs. Published by The Ronald Press Co., 15 E. 26th St., New York 10, N. Y. Working forms, diagrams, formulas, charts, and tables. Sturdy flexible binding, gilt-stamped. Price, \$7.50.

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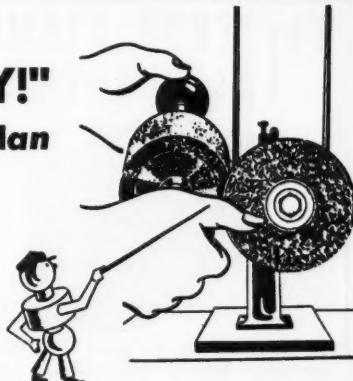
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practically anyone in manufacturing. According to the publisher, the principles and methods presented in the book are of fundamental engineering soundness, dependable for the most important policy decisions of the president, superintendent, and general manager where production is concerned.

Methods men, time and motion study men, inspectors, supervisors, planning department personnel, and all other operating men will find the book of particular use in their own specialties and also for clearly understanding the work of other departments and the general system of the factory. The industrial controller and the cost accountant will find in the volume concise, specific, and quickly accessible information on the things they have to understand regarding production—particularly production control, purchasing, estimating, material control, time study, operation analysis and standards, wage-plan design, classification, and symbols.

"Production Handbook" is divided into 25 sections as follows: Plant Organization; Production Planning and Control; Production Control Systems; Purchasing; Materials Control and Standardization; Storekeeping; Time Study and Operation Analysis; Motion Study—Work

Simplification; Inspection; Quality Control; Plant Layout; Machinery; Tools, Jigs and Fixtures; Materials Handling; Job Estimating; Job Evaluation; Merit Rating; Wage Plans; Plant Maintenance; Measures of Performance; Classifications and Symbols; Principles of Management; Manufacturing Costs; Factory Budgets; and Plant Personnel. Hundreds of working forms, diagrams, formulas, charts, and tables are included. In addition, for convenient reference to manufacturing problems, the book contains 40 double-column pages of index.

Electric Motor Maintenance. By W. W. McCullough. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. 126 pages. Cloth binding, board covers. Price, \$2.00.

As its title implies, this volume comprises a practical, detailed manual devoted to the maintenance and repair of electric motors and is intended for inspectors, mechanics, supervisors, and students. The author, who is associated with the Westinghouse Electric Corporation's Manufacturing and Repair Division, is a service engineer of long experience and has designed his book as an on-the-job tool for maintenance men, plant electricians, power plant and central station operators, electrical contractors, and marine operating personnel.

The book is divided into three distinct sections. The first section, dealing with mechanical maintenance, covers motor assembly, bearings, current collecting devices, and air gaps. Part II, on electrical maintenance, treats of insulation (materials, cleaning and drying, and testing). Part III, "Operation and Application," discusses the characteristics of induction; direct-current, synchronous, and gear motors; motor-generator sets; and electric couplings.

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Finishes for Aluminum (Sections One and Two). Published by Reynolds Metals Co., Dept. 27, 2500 S. Third St., Louisville 1, Ky. Price \$2.00.

Aluminum offers many valuable and interesting combinations of surface finishes for enhancing its appearance. To indicate some of the important possibilities, Reynolds Metals has published "Finishes for Aluminum" in two volumes.

The first volume, Section One, is wire bound and contains 108 pages devoted to 8 cleaning treatments, 17 mechanical surface finishes, 15 chemical surface finishes, 11 electrolytic oxide treatments, 12 electroplated coatings, 7 paint application methods, 7 paint coatings, ceramic coatings (vitreous enamels), and special finishes such as silk screen and sprayed metal finishes. It concludes with a discussion of various controls and tests for finishes.

The second volume, Section Two, supplements the information contained in the first volume with 120 pages of shop data on materials, equipment, solution preparation, procedure, and control for more than 30 of the most widely used finishing processes. This volume is supplied in a separate loose-leaf binder, and new and revised bulletins will be issued

at intervals to keep the information up-to-date.

"Finishes for Aluminum" (two volumes) offers users of aluminum an effective means of keeping up with the many advances being made in this particular phase of aluminum processing.

Manual of Foundry and Pattern Shop Practice. By Otis J. Benedict, Jr. Published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18, N. Y. 361 pages. Illustrated. Cloth binding, semi-flexible covers. Price, \$3.25.

This volume comprises an exceptionally detailed presentation of the fundamentals of pattern design and construction, molding, cupola operation, pouring, cleaning, and inspection of castings. The text is divided into two parts for convenience in teaching. Part I deals with foundry practice, no attempt being made to cover the entire ferrous and non-ferrous field but to set forth the fundamental principles as applied to the production of gray iron castings.

Part II is a complete text on pattern design and construction. No attempt has been made to describe the tools of the

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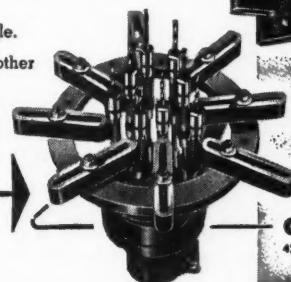
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trade or the mode of using them. The material presented is planned to afford the student a clearer understanding of the problems involved and the construction and use of patterns, core boxes, follow boards, match plates, and sweep work as used in the production of castings. The characteristics of wood and glue are dealt with, as well as plywoods and veneers.

A feature of the book is a list of visual aids—motion pictures and filmstrips—correlated with the material in the text. The book also presents a group of problems suitable for either pattern design or pattern construction, or both.

Welding Symbols. By Vincent C. Gourley. Published by The Bruce Publishing Co., 540 N. Milwaukee St., Milwaukee 1, Wis. 115 pages. Illustrated. Cloth binding, board covers. Price, \$2.50.

Standard and symbols explained in this book are the ones recognized by the American Welding Society through whose efforts they have been simplified and reduced to the least possible number. The general standards for the use of arc and gas-welding symbols as well as resis-

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This complete work on the uses and meanings of welding symbols should be of particular interest to workmen and students in the fields of drafting, design, welding, and engineering. The author has served since 1942 as a consulting and processing engineer in the U. S. Army Ordnance Division. His experience includes work in education, art, experimentation, invention, archaeology, and anthropology.

A Practical Theory of Mechanisms. By Paul Grodzinski. Published by Emmott & Co., Ltd., 31 King Street West, Manchester 3, England. 166 pages, $4\frac{1}{4} \times 6\frac{1}{2}$ inches. Cloth binding, board covers. Price, 7/6 net (\$1.65).

This volume provides a classification and description of mechanisms applied in machines and instruments. The contents consist of an introduction followed by eight chapters. An alphabetical index rounds out the book.

The eight chapters of the book are headed as follows: Chains of Links and Element Pairs (basic mechanisms, kinds of movements, chains of mechanisms, pairs of elements, form constraint and force closure, form and shape of element pairs and members, and representation of mechanisms); The Screw Mechanism

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(simple screw mechanisms and mechanisms with several screw pairs); The Four Bar Link and Derived Mechanisms (four bar link mechanisms, parallel and anti-parallel link mechanisms, slider crank mechanisms, mechanisms with two sliding pairs, straight-line movements, survey, and wedge mechanisms); Cam Mechanisms (general, plain cam mechanisms, and spherical cam mechanisms); Gear Trains (simple gear trains, epicyclic gearing, and friction gearing); Belt and Fluid Drives (band drives and fluid gears); Ratchets (ratchet gears, friction ratchets, and indexing mechanisms); and Appendices (examples for classification, conditions for form constraint, and bibliography).

Steel Castings. By Eric N. Simons. Published by Chemical Publishing Co., Inc., 26 Court St., Brooklyn 2, N. Y. 216 pages. Cloth binding, board covers. Price, \$5.00.

Of particular interest to designers, engineers, metallurgists, foundry workers, purchasing agents, and students, this volume provides a complete review of principles and practice involved in the

production of steel castings. In a simple and convenient manner, the book presents all pertinent and practical facts required to understand the manufacture, properties, and uses of steel castings. The author presents the information in such a way that the reader can follow the subject from raw material to finished product.

The contents of the book are divided into 17 principal sections as follows: Introduction; The Raw Materials; Melting Processes; Patterns; Foundry Sands; Molds and Cores; The Centrifugal Casting of Steel; Post - Casting Processes; Heat-Treatment; Machining; Inspection and Testing; Steels for Castings; Steels for Castings (continued); Steels for Castings (continued); Buying Steel Castings; Interesting Steel Castings (castings for dredgers; matte ladle castings; stainless steel castings; chilled roll castings; half nosing; axleboxes; superheaters; steam dryer bodies; railway ramps; chain; feed pipes; excavator castings; mantle castings; heat-resisting furnace castings; permanent magnet castings; brake drums; half bases; crankshafts; railway buffers; discs and pinions; links; "banjo" castings; glass plant castings; and burners); and Index.

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Lessons in Arc Welding. 3rd edition. Published by The Lincoln Electric Co., Cleveland, Ohio. 158 pages, 5½ x 8½ inches. 228 illustrations, including photographs and drawings. Semi-flexible simulated leather cover, gold embossed. Price (postage prepaid), 50 cents in the U. S.; 75 cents elsewhere.

Completely revised over previous editions, this volume is designed to provide both new and experienced welders, as well as all persons interested or concerned with the subject, with complete and thorough instructions in all phases of arc welding. The book includes 58 lessons and is illustrated with photographs and drawings to supplement the text. Helpful features include questions and answers contained in the last 30 pages of the book. The questions and answers are separate and are separated from the text so as to make the section easy to use for quizzes and self-examination.

The book sets forth in simple language the practical instruction based on the experiences of Mr. Arthur Madson, head instructor in the Lincoln Arc Welding School. Published with the objective of aiding those interested in welding to use the process successfully and economically, the book explains the fundamentals of the arc welding method of joining met-

als by the fusion principle and incorporates a wealth of new information such as a complete treatment covering welding with alternating current, including both machines and electrodes, in addition to the lessons on direct current welding; new procedures covering large electrodes with recommendations as to their use; newest electrodes and their use; number of lessons on pipe welding; and data on the qualification of welding operators. A feature of particular interest is the complete discussion of distortion with recommendations regarding its prevention and control. An additional feature is Lesson 47 containing a complete description of the principles of hard facing.

The Blueprint Language of the Machine Industries. By Henry Cecil Spencer and Hiram E. Grant. Published by The MacMillan Co., College Dept., 60 Fifth Ave., New York, N. Y. 255 pages. Illustrated. Metal-ring binding, board covers. Price, \$5.00.

The aim of this book is to provide fundamental training in blueprint reading with the necessary emphasis upon the visualization of views of objects. Work-

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In preparing the book, the "completion problem" idea has been adopted to make it possible to cover a very wide range of problems in a relatively limited time. Special easy-sketching cross-section grids are provided in order that students without any marked ability in sketching may proceed easily with the work. These problems are designed to bring out principles and are sufficiently difficult to make the student think. A considerable number of facsimile reproductions are included at the end of the book. These reproductions have been carefully selected to provide a broad view of the practices of various companies and to cover fundamental principles. Worksheets, with questions and grids for sketching accompany the blueprints.

The contents of the book are divided into 16 chapters which are headed as follows: Industrial Prints; Views of Objects; Normal Surfaces and Edges; Inclined and Oblique Surfaces and Edges; Cylindrical Surfaces and Edges; Sectional Views; Auxiliary Views; Screw Threads and Fasteners; Dimensioning; Shop Process; Reading Micrometer Caliper and Height Gage; First-Angle Drawings; Right-Hand and Left-Hand Drawings; Welding Representation; Gears; and Commercial Blueprints. An appendix and index round out the book.

Organization and Management in Industry and Business. Third Edition. By William B. Cornell. Published by The Ronald Press Co., 15 E. 26th St., New York 10, N. Y. 819 pages. Cloth binding, board covers. Price, \$5.00.

The gratifying reception accorded to this book in its previous editions has impelled the author to undertake the preparation of a third edition. In this edition the author has attempted a thoroughgoing revision to bring the presentation of the subject fully into line throughout with the most up-to-date practices of progressive modern companies. Significant new developments which business executives have found it expedient to introduce into their organizations have been brought in to indicate today's basic trends toward improved methods. New approaches to major problems calling for immediate solution, such as those of personnel administration, have been highlighted to show clearly their practical effects upon present-day industrial and business operation.

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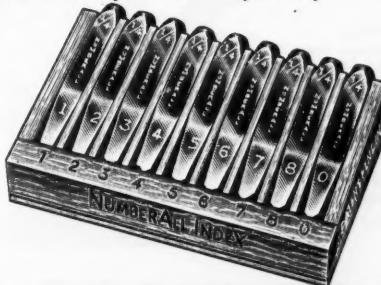
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been developed through the author's many years of experience in teaching courses on the organization and management of industrial and business concerns. It is intended for use in schools of commerce and colleges of engineering where detailed attention is given to the discussion of the problems and activities of such organizations. It is so designed that it may also be used where orientation rather than applied courses are given on such subjects.

Fundamentally, the aim in preparing the test has been to give the student information which he requires not merely in such a way that he can readily master the facts on management and organization problems, but further so that he can think his way successfully through business problems and reason clearly and analytically in arriving at result-producing conclusions. With the development of this ability it is hoped that he will be prepared eventually to plan and direct the work of others and bring into play their best talents, thus qualifying himself for constructive leadership.

The text has likewise been made broad in scope but particularly specific in details. Each topic has been discussed in the light of what an executive needs to know to obtain the best results in operation.

Three features in the book are believed to be unique. The first is an analysis of the industrial problem, showing the way in which an entire program is worked out, beginning with a thorough study of products and possible markets, following through with the determination of all the manufacturing facilities necessary, and finally ending with the requirements to be met in financing the business.

The second feature is the building of the discussion around the departmental setup of the industrial plant so that the methods used to carry on the various activities may be presented in the everyday setting where the work is actually done. The third feature is the presentation, for each department, of (1) a typical form of organization to carry on the various subdivisions of the work, (2) representative procedures based on actual practice showing how the work is performed, and (3) the qualifications and duties of the key personnel in charge of doing such work. Liberal use of illustrations has been made so that these explanations may be both clear and specific.

Contract Clauses for Cost-Conscious Employers. Published by Labor Relations Institute, 1776 Broadway, New York 19, N. Y. Price, \$2.25.

A manual of contract provisions, procedures, and policies for the guidance of management, this work covers every important phase of collective bargaining, including such essential topics as wage incentives, cost-of-living changes, merit rating, recognition, union security, management prerogatives, grievance procedure, disciplinary action, seniority, layoffs and transfers.

Not content with merely citing the verbatim text of numerous clauses to meet each specific variation of a problem, the editors have set these provision in a con-

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text of common-sense advice on collective bargaining give-and-take. For example, the pages on "Cost-of-Living Changes" point out to the employer how to make the reopening clause in his contract work both ways, so that he, as well as the union, can ask for a resumption of wage negotiations, as he will wish to do if there is a substantial drop in the national cost-of-living. Four clauses on this subject are given—one of a general type; a second that contains a six-month interval proviso; a third that limits reopenings to one for each party during the life of the contract; and, finally, one that is designed to prevent breaks in production during the negotiations.

Another example of this treatment is afforded by the wage incentive provisions, of which there are six in the manual. These clauses accomplish the following objectives, in the order given: (1) set forth the objectives of the incentive plan; (2) outline the benefits to be obtained by both parties; (3) specify in detail just how the system will operate; (4) establish the employer's right to administer the plan; (5) provide for production standards and their revision, if the latter becomes necessary; and (6) make provision for temporary incentive

standards while a job is being re-rated, or in the event of new operations.

All provisions presented in the manual have been selected with a view both to their managerial practicality—as established through actual use—and to clarity of expression.

Heat Pumps. By Philip Sporn, E. R. Ambrose, and Theodore Baumleister. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. 188 pages. Illustrated. Cloth binding, board covers. Price, \$3.75.

Believed to be the first full-length volume devoted exclusively to the consideration of heat pump design and installation fundamentals and to applications of the device in building heating and cooling and in industry, this book is expected to arouse considerable interest among engineers, architects, contractors, and manufacturers. The authors have been intimately associated with the development of the heat pump, and their combined experience with the design, operation, and maintenance of such installations is believed to exceed that of any similar group in the country.

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In the book, the subject is presented by successive consideration of the thermodynamic principles involved; equipment design, specification, and selection; and maintenance, operating, economical, and installation problems. The treatment is reasonably technical, however, there is no inclusion of theory beyond that essential for the understanding of good installation and assembly.

As pointed out in the book, applications of the heat pump to building heating and cooling are not limited to office and industrial structures but open up a vast field for home installation. Development in this latter direction will, of course, be of vital concern to architects, heating and ventilating contractors, electric power companies, and home owners themselves.

Wage Rate and Contract Provisions Report. Published by National Foremen's Institute, Inc., 10 High St., Deep River, Conn. 72 pages, $7\frac{1}{4} \times 8\frac{1}{4}$ inches. Price, \$2.50.

A feature of this report is information regarding the actual negotiated wage increases granted by over 350 companies in 51 basic industries. Prepared by the La-

bor Relations Staff of the N.F.I., the report presents the negotiated wage increases by area, industry, company, and union. For each increase reported, the report also provides the number of employees involved, the amount of the increase, and the latest union contract provision.

In order to obtain the wage rate data, researchers and field men of the Labor Relations Staff scanned over 350 collective bargaining contracts. They then arranged their findings in convenient form so that the reader can obtain "at-a-glance" information on negotiated wage increases. The report is recommended as a useful guide when dealing with all questions involving wage rate.

Handbook of Engineering. Fourth edition. By L. A. Waterbury. Revised by H. W. Reddick, W. M. Lansford, C.O. MacKey, H. H. Hibble, and H. S. Bull. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. 386 pages. Cloth binding, flexible covers. Price, \$2.50.

An up-to-date version of the well-known Waterbury pocket handbook, this edition lists mathematical engineering data under the heading of algebra, trigonometry, mensuration, analytic geometry, differentials and integral calculus, theoretical mechanics, mechanics of materials, mechanics of fluids, heat engineering, and electrical engineering. New sections have been added covering illumination engineering and radio-electronics formulas.

In addition to the revised tables from the previous edition, the book contains additional tables on (1) the properties of saturated water and steam, (2) the properties of saturated water and steam, (temperature table), and (3) the properties of superheated steam. The volume is intended for both the novice and experienced engineer in making quick and accurate mathematical calculations.



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New Shop Literature

Rockford Hy-Draulic Slotters. A 20-page bulletin prepared by the Rockford Machine Tool Co., Rockford, Ill., presents detailed information on the design, construction, and application of its 36 and 48-inch stroke slotters. Features of particular interest include dimensional diagrams which clearly illustrate the work range of the slotters. Provided in specification form, as well as completely described, are all facts relating to slotter feeds and speeds. Copy of Bulletin 460 free to mechanical executives upon request.

American Speed-Jack Drives are discussed in a bulletin now being issued by The American Pulley Co., Philadelphia 29, Pa. The bulletin features easy-to-use drive tables and charts that enable users to quickly select the proper size sheaves for the desired range of speed. In addition, the bulletin shows construction details and suggested applications for American Speed-Jack Drives. Other pages

in the bulletin discuss the unique Speed-Jack Drive features of universal mounting in any position in or on the machine and remote control of machine speed through a flexible shaft. Copy free.

Keller Burs and Accessories. Pratt & Whitney, Division Niles - Bement - Pond Co., West Hartford 1, Conn., has issued a 40 page catalog covering its complete line of Keller Burs, which include master-ground, cylindrical, ball, oval, barrel, flame, tree (radius end and pointed), bi-shape, double taper, long taper, long cylindrical, tapered, deburring, inverted cone, concave, $\frac{1}{8}$ and $\frac{1}{16}$ -inch shank, master-ground carbide, and file-cut burs. Also covered are various flexible shaft accessories, such as sanding and polishing drums, abrasive belts, midget sanding discs, sanding pads and discs, grinding wheels, mounted stones, arbors, pencil stones, Crystolon sticks, felt polishing wheels, wire brushes, and mill cable.

Copy of the catalog is available free to mechanical executives addressing requests on their company letterheads.

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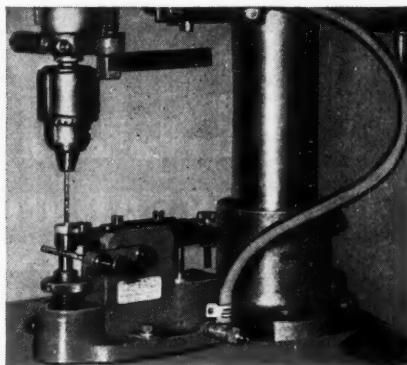
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G&E Shapers. Gould & Eberhardt, Inc., Irvington, 11, N. J., has published a 32-page illustrated bulletin covering its 16-speed all-helical gear drive toolroom and industrial shapers. The bulletin presents data on 14 and 16-inch plain toolroom shapers with front-table supports and guides, and a 16-inch toolroom shaper with an extension base and front table support and guide, all of these machines being built especially for light tool and die and other small work. Similar data are presented on industrial shapers which are available in sizes ranging from 16 to 36-inch stroke and are especially adapted for heavy tool, die, and the larger general work. Various attachments available for the shapers are also shown and described. Copy of Bulletin No. 231 free to mechanical executives upon request.

Involute Spline Cutting Tools. Illinois Tool Works, 2501 N. Keeler Ave., Chicago 39, Ill., announces a booklet containing tooling recommendations for the production of involute splines in accordance with the recently adopted American Standard for Involute Splines, B 5.15—1946. Entitled "Involute Spline Cutting

Tools," the booklet deals with the basic principles involved in tooling for the manufacture of various types of involute splines and specifies proper hobs, shaper cutters, and broaches for producing each type of spline to dimensions and tolerances specified by the A. S. A.

For convenience, applicable portions of the new involute spline standard are reproduced, together with listings of proper cutting tools for internal and external splines of all types and sizes. Copy of the booklet is available free upon request.

The Profilometer. A comprehensive story on surface roughness measurement and its relationship to production and quality control is presented in a six-page illustrated bulletin issued by the Physicists Research Co., 321 S. Main St., Ann Arbor, Mich. The bulletin includes suggestions on establishing a surface roughness specification and control system. It also explains how the Profilometer is used (1) to obtain a positive check on roughness specification in definite microinch units over any desired length of surface; (2) to shorten or eliminate production operations; (3) to detect impending dimensional errors before they occur; (4)

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to permit accurate dimensional control; and (5) to obtain a consistent finish from cutting tools. Numerous photographs show how leading manufacturers are using the Profilometer in both inspection and production departments. Copy free.

"Austempered Cast Iron Serves as Cylinder Liners," an article by C. W. Ohley, Chief Engineer, Special Products Div., Thompson Products, Inc., is the subject of a four-page illustrated reprint now available free from the Ajax Electric Co., Inc., Frankford Ave. at Delaware Ave., Philadelphia 23, Pennsylvania.

Pratt & Whitney Die Sinkers. A 12-page circular published by Pratt & Whitney, Division Niles - Bement - Pond Co., West Hartford 1, Conn., illustrates and describes plain and universal die sinkers, each type of which is available in two sizes. The various construction features comprising the machines are discussed and depicted, and a complete table of specifications is included. Copy of Circular No. 485 free upon request.

"Torch Brazing Aluminum" is the title of a 12-page reprint now being distributed by the Air Reduction Sales Co., 60 E. 42nd St., New York 17, N. Y. Written by Harry A. Huff, Airco's brazing specialist, the article, which is illustrated with photographs and descriptive diagrams, covers such topics as the advantages of aluminum brazing, types of aluminum, strength and corrosion resistance, filler metals and fluxes, cleaning procedure, and production torch brazing. Copy of the reprint is available free upon request.

"Oxyacetylene Cutting in Sheet Metal Work" is the title of a 12-page reprint announced by the Air Reduction Sales Co., 60 E. 42nd St., New York 17, N. Y. Written by R. F. Helmkamp, the article is illustrated with 22 photographs and line drawings. The first half of the article covers the fundamentals of machine gas cutting, equipment needed, and cost of operation. The last half of the article concerns itself with specific shop applications of the process such as stack cutting. Reference is also made to Airco's new flux-injection method for cutting stainless steel. Copy of reprint free upon request.

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Copy of the catalog is available free to mechanical executives addressing requests on their company letterheads.

Warner & Swasey Electro-Cycle Turret Lathe is the subject of an eight-page folder published by The Warner & Swasey Co., 5701 Carnegie Ave., Cleveland 3, Ohio, which features information regarding economies obtained in brass shops where the turret lathe has been in use for 18 months. A description of the construction details of the machine is included, together with a production record. Copy free upon request.

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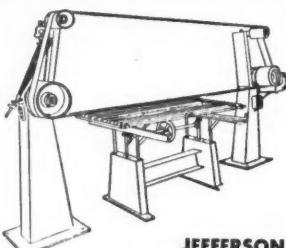
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Willey's Tool Catalog No. 30. The Willey's Carbide Tool Co., 1342 W. Vernor Highway, Detroit 1, Mich., announces the availability of a 40-page catalog containing illustrated, descriptive, and tabular information, including prices, on standard tungsten carbide cutting tools and blanks, special tips, tipped shell end mills, core drills and reamers, special tipped tools and milling cutters, ring and plug gages, circular saws, bushings, tipped gages, centers, sizing, extrusion and wire drawing dies, centerless grinder work support blades, masonry drills, carbide tool grinders, and diamond dressers. Tables of recommendations for machining steel, ferrous alloys, and non-ferrous and non-metallic materials are included in the catalog, as well as a table of recommendations of cutting speeds in feet per minute for carbide tipped milling cutters.

Copy of Catalog No. 30 is available free to mechanical executives upon request.

Bunting Bronze Products. A 68-page catalog on standard bronze bearings, bronze bars, and bronze electric motor bearings is now being distributed by The Bunting Brass & Bronze Co., 715 Spencer St., Toledo 9, Ohio. The catalog includes complete listings of new bar sizes, new standard stock sizes, and new electric motor bearing sizes. In addition, it describes by text and drawings special bearings which Bunting manufactures to user blueprint specifications. The catalog also includes engineering information covering the installation of bearings, recommended table of press fits, instructions for grooving and for the selection of the proper type groove, typical housing and lubrication designs for sleeve bearings, and instructions for the grinding of tools to machine cast bearing bronze. Copy of Catalog No. 46 free to executives upon request.



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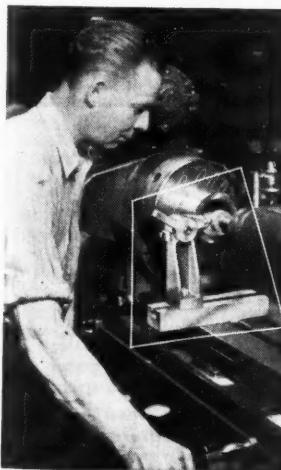
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Turchan Hydraulic Follower Machine. A catalog illustrating and explaining how the Turchan Hydraulic Follower Machine can be used for duplicating dies, molds, patterns, or original forms from hard or soft models with fidelity, accuracy, and extreme rapidity is now available free from the Turchan Follower Machine Co., 8259 Livernois, Detroit 4, Michigan.

Michigan Model 870-A Automatic Underpass Rotary Gear Finisher, product of the Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich., is described in a four-page two-color technical bulletin released by this firm. Shown in the bulletin in detail is the manner in which any of three different finishing methods (Underpass shaving, Transverse shaving, and Traverpass shaving) can be readily selected on the machine, which is produced in three sizes for gears up to maximum diameters of 8, 12, and 18 inches respectively. Recommendations are given as to when to use each shaving method. In addition, the bulletin includes a technical presentation of the principles involved in each of the three shaving methods, as well as details of the machine and specifications. Copy of Bulletin No. 870A47 free upon request.

"Braze and Save." In line with its policy of providing educational aids to users of tungsten carbide, the Adamas Carbide Corp., Dept. M, 1818 Broadway, New York 23, N. Y., has prepared a 12-page booklet containing complete instructions on how to braze carbide with maximum efficiency and economy. Entitled "Braze and Save," this profusely illustrated pocket-size booklet describes the equipment and materials required in torch, furnace, and induction brazing, and presents data on how to "sandwich" braze. All operations are discussed in detail, with explanatory drawings provided. Copy free.

"Mounted Wheels and Related Abrasive Products" is the title of a 32-page illustrated handbook published by The Carborundum Co., Niagara Falls, N. Y. A wide range of wheel shapes and sizes, a variety of abrasives and coated abrasive discs, sleeves and cartridge rolls available for use on lightweight high speed portable grinders are discussed and depicted. Photographs and diagrams are provided to assist correct identification and selection, to illustrate careful handling and storage, and to show proper and efficient applications. Copy free.



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"Hydraulic Equipment." The increasing use of oil-hydraulic power in all branches of industry has led to the publication of a 44-page booklet entitled "Hydraulic Equipment" by the Shell Oil Co., Inc., 50 W. 50th St., New York 20, N. Y. Prepared under the direction of the company's lubricants department, the booklet includes chapters on hydraulic principles, hydraulic systems and equipment, hydraulic oil requirements and performance characteristics, and the maintenance and cleaning of hydraulic systems. The booklet emphasizes that smooth, efficient, economical operation of any oil-hydraulic mechanism depends as much on the liquid which transmits the power as on the design, construction, and operation of the mechanical parts.

Copy of the booklet is offered free to mechanical executives addressing requests on their company letterheads.

Allis-Chalmers "Pedrifugal" Pedestal Type Centrifugal Pumps are outlined as to operating advantages and construction features in a four-page bulletin released by the Allis -Chalmers Mfg. Co., Milwaukee 1, Wis. In addition to diagramming nine construction features which provide

for economical and efficient operation, the bulletin presents a pump, motor, and Texrope drive selection table. Also included are standard dimension tables of the Pedrifugal pump. Copy of Bulletin 52B6691 free upon request.

Gasmaco Industrial Furnaces. A six-page folder published by The Gas Machinery Co., 16120 Waterloo Rd., Cleveland 10, Ohio, illustrates and describes fuel fired high temperature furnaces for all types of heat treatment. Copy free upon request.

Form Grinding Service. A four-page illustrated bulletin published by the Spiral Manufacturing Corp., 3612-26 N. Kilbourn Ave., Chicago 41, Ill., describes a complete precision form grinding service for modern production step drills, subland drills, circular or flat form tools, special form relieved cutters, carbide-tipped drills and reamers, combination drill, counterbore and tap sets for toolroom use, and special purpose tools. Copy free upon request.

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That Eliminates the Breaks in the Profile at the Points of Tangency.

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Three Simple Adjustments and It's Set-Up.

The Jeon Dresser will dress a radius (within .0001") either concave or convex, with angles absolutely tangent (to a split second) on either or both sides of the arc, IN ONE CONTINUOUS OPERATION. Also, any combination of angles or angles and arcs.

Write for Prices and Folder Describing Its 20 Outstanding Features
Manufacturers' Representatives Wanted

JEON MANUFACTURING COMPANY

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"Buy on Performance" is the title of an eight-page pamphlet written by the Lubrication Committee, American Petroleum Institute, and now being distributed by the Freedom-Valvoline Oil Co., Dept. 167, Freedom, Pa. The pamphlet provides a treatise on the practice of buying by specification as against buying by brand name. It points out that a manufacturer's responsibility ends with the meeting of specifications—from that point on "let the buyer beware." Products purchased by brand names hold their manufacturers responsible for their performance. Copy free upon request.

N-M Fabrication Handbook. An attractive 16-page handbook containing general informational data and practical fabricating suggestions relative to the proper handling of prefinished Nickeloid Metals is now being issued by the American Nickeloid Co., Peru, Ill. The handbook, showing the practical workability of Nickeloid Metals under modern mechanical production methods, illustrates and describes proper bending, blanking, drawing, etching, forming, riveting, seaming, soldering, and welding operations involved in the successful handling of these metals. General information is included as to the kinds, styles, and patterns available in the N-M line of materials. Properties, sizes, weights, gauges, and conversion factors are charted for easy reference.

An interesting and practical feature of the handbook is its discussion of various uses of Nickeloid Metals. Numerous illustrations are included which show the application of Nickeloid Metals to achieve functional beauty in modern products. The handbook is available free to members of the metal fabricating field addressing requests on company letterheads.

Brown Converters. The company's line of mechanical converters which are designed to convert vertical or horizontal rotating motion to a corresponding reciprocating motion and simultaneously increase unit power output are illustrated and described in a four-page folder now available from the Leo G. Brown Engineering Co., 1127 Riverside Dr., Los Angeles 31, Calif. Prices and other information are presented on drill press converters, all-electric converters, and milling machine converters. Similar data are presented on rotary and stationary base tables. Copy free upon request.

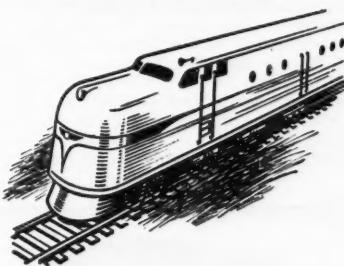
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Progressive Press Type Spot and Projection Welders. A strikingly illustrated 12-page bulletin describing its complete line of press type spot and projection welders and containing considerable information of value to the purchasing agent, as well as to the design engineer, has been made available by the Progressive Welder Co., 3050 E. Outer Dr., Detroit 12, Mich. In addition to tables of specifications, installation dimensions, and rated spot welding capacities, as well as data on standard features and standard extras, the bulletin includes numerous line drawings illustrating the theory and application of spot and projection welding, and phantom views to show details of machine construction. Copy of Bulletin No. 603 free upon request.

Niagara Electronic Automatic Welding Machine is the subject of a 12-page bulletin published by the Niagara Machine & Tool Works, 637 Northland Ave., Buffalo 10, N. Y. The bulletin illustrates and describes the operation of the machine and its use in welding parallel to track, welding parallel to beam, and other applications. Copy of Bulletin 83 free.

Minerva Curvimeter, a Swiss device for accurately measuring distance by running the instrument along the lines of a blueprint or plan, is the subject of a six-page illustrated and descriptive bulletin prepared by the Herman H. Sticht Co., Inc., 27 Park Pl., New York 7, N. Y. Copy free upon request.

Federal Type "S" Seam Welders. The Federal Machine and Welder Co., Warren, Ohio, has published a 12-page bulletin containing descriptive information and specifications on its longitudinal, circular, and universal seam welders. Low carbon sheets, stainless steels, plated and coated steels, aluminum, and a wide variety of dissimilar metals lending themselves to welding by the equipment are shown in the bulletin, which describes the basic types of seam welders and then provides more detailed information on the ratings, capacities, operation, control equipment, and so on, of the various types. Copy of Bulletin No. 4650 free upon request.

Inco Welding Materials. A 16-page booklet on the materials required for the metal-arc, oxyacetylene, and submerged melt welding of nickel and the high nickel alloys has been published by The International Nickel Co., 67 Wall St., New York 5, N. Y. The booklet also lists such general information as the type of welding rods to use, recommended amperages for electric-arc welding, and the proper flux to select for gas welding and brazing. Data are also furnished on technical booklets on the subject of welding of the high nickel alloys and sources of supply for electrodes and gas welding wire. Copy free upon request.

Miller A. C. Welders for "Heliarc" welding are described and illustrated in a four-page catalog published by the Miller Electric Manufacturing Co., Appleton, Wis. In addition to covering the two models in which the welders are available (40-300 amp. and 10-175 amp.), the catalog provides a description of the Heliarc process of welding. Copy free upon request.

"Rustavoid" Rust Preventives, which are claimed to offer complete protective treatment for the thinnest of residual films providing temporary protection between manufacturing operations to permanent coatings for parts or equipment going into storage in or out of doors, are discussed in a four-page illustrated folder released by the F. E. Anderson Oil Co., Portland, Conn. The company has also prepared a handy data sheet on solvent, grease, and lube oil preservatives. The sheet is of heavy card stock and is punched for convenient wall mounting.

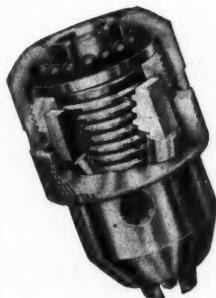
Copy of the Rustavoid folder, as well as data sheet, is available free.

Danneman Precision Die Sets. The Danneman Die-Set Co., New York 12, N. Y., has prepared a 32-page catalog covering its complete line of Style "A" die sets, including reverse type die sets, regular type die sets, square type die sets, square type die sets with round punch holders, round type die sets, and round type die sets with square punch holders. Also included are data on standard, long, special long, and extra long bushings; die bars for die sets; and precision hardened, ground, and lapped leader pins.

Copy of Catalog 45A is available free to mechanical executives upon request.

New York Stock Gears. A 98-page pocket-size catalog now available from the New York Gear Works, 130 91st Ave., Richmond Hill 18, N. Y., presents illustrated, descriptive, and tabular information, including price lists, on a complete line of gears, which comprises bevel, miter, spiral, spur and worm gears, as well as pinions and worms. A section of the catalog is also devoted to gear calculations.

Copy of the catalog is available free to mechanical executives upon request.



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New Britain Models 475, 49, and 412 Four-Spindle Automatic Chucking Machines are the subject of a 12-page catalog published by the New Britain-Gridley Machine Division, The New Britain Machine Co., New Britain Conn. The catalog provides illustrations and complete descriptions of the machines, which are identical in basic construction and design, differing only in size and chuck capacity. Specifications of each machine are included in the catalog, copy of which is available free upon request.

"**Rototrol**," a device for automatic operation of electrical equipment, is illustrated and described in a 36-page booklet announced by the Westinghouse Electric Corp., P. O. Box 868, Pittsburgh 30, Pa. The booklet explains how Rototrol regulates voltage, speed, current, power, speed and torque, power-factor, and position, and provides stability control and current limiting. Photographs, schematic diagrams, and performance curves are used to describe Rototrol applications in the automotive and aviation, construction, machine tool, marine, metal-working, mining, rubber, textile, and other industries.

Seven pages of technical information are also included, providing additional data on the theory, design, and operating principles of standard Rototrols and several frequently - used modifications. Copy of Booklet B-3649 free.

"**Involute Spline Cutting Tool Recommended Dimensions**" is the title of a bulletin now being offered by the Illinois Tool Works, 2501 N. Keeler Ave., Chicago 39, Ill. The bulletin is designed to reduce the many pages of the complete A.S.A. Involute Spline Standard B 5.15-1946 to eight pages of dimensions on hobs, shaper cutters, and broaches, with hob stock list and prices also presented, as well as many important points to remember when ordering hobs, shaper cutters, and broaches. Copy of Bulletin No. 25 free upon request.

AL Tool and High Speed Steels. The Allegheny Ludlum Steel Corp., 2020 Oliver Bldg., Pittsburgh 22, Pa., has issued a list of tool and high speed steel warehouse stocks which not only indicates types, shapes, and sizes available, but also shows the exact location of each item in stock. The catalog contains 62 pages of indices of all high speed and tool steels marketed by Allegheny Ludlum through its warehouse system. Each page is laid out in graph form with the company's 18 warehouses represented vertically and sizes listed horizontally. Symbols, used to designate flats, squares, and rounds, are placed to indicate whether a given warehouse stocks the particular shape and size needed. Additional pages list the company's warehouse and sales office locations and present basic information on the product listed. The final pages of the catalog are devoted to Carmet (sintered carbide) products available. Copy free.



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Good Grade Yellow Brass

16 oz.	\$10.80 per dozen
24 oz.	14.40 per dozen
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198-A Lafayette St., N. Y. 12, N. Y. CANal 6-1441

"Presto" Improved Neoprene Contact Wheels of special design which are made in a wide range of densities and sizes for abrasive belt polishing are described in a bulletin prepared by The Manderscheid Co., Dept. 114, 810 Fulton St., Chicago 7, Ill. Copy of Bulletin 105 free upon request.

Allis-Chalmers Process Pumps. A line of centrifugal process pumps designed for severe wear and particularly adaptable to the chemical, food, and paper industries is described in an illustrated four-page bulletin announced by the Allis-Chalmers Mfg. Co., Milwaukee 1, Wis. Copy of Bulletin 08B6615 free.

Hydro-Power Hydraulic Pumps. A complete line of radial piston-type hydraulic pumps supplying pressures up to 3,000 p.s.i. are described in a bulletin published by Hydro-Power, Inc., Belmont and Sheridan Aves., Springfield, Ohio. Dimensional charts for pumps rated from 1.25 radial g.p.m. to 185 g.p.m. are included, as are characteristic horsepower/volume/pressure curves. Three types of available control are described. Copy free upon request.

Talide Metal. The Metal Carbides Corp., Youngstown, Ohio, announces the publication of an eight-page catalog presenting complete prices and specifications on Talide Metal for wear-resistant applications. Listed in the catalog are 1,325 different sizes of standard solid tungsten carbide blanks, bars, strips, rods, tubes, bushings, rings, flats, tips, discs, and shapes. Copy of Catalog No. 47-WM free upon request.

Northwestern Precision Parts. A four-page folder prepared by the Northwestern Tool & Engineering Co., 117 Hollier Ave., Dayton 3, Ohio, presents illustrated, descriptive, and tabular information on precision parts for jigs and fixtures, including knurled head screws, quarter-turn screws, shoulder screws, double-end jig feet, and screw and press-fit type jig feet and reset pads. Similar data are also presented on step blocks for lathes, punch presses, milling machines, jig borers, boring mills, slotters, and so on, as well as on handy stud sets for milling machines and punch presses. A chart for use in selecting the proper stud set to fit various machinery is also included in the folder, copy of which is available free.



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BEFORE discarding taps and reamers because you think they are not doing perfect work, make this simple test! Try them in a Ziegler Floating Tool Holder!

In many cases you'll find that the trouble was due not to the tool being faulty but rather to a faulty set-up. By using a tool holder which automatically compensates for spindle alignment inaccuracies of as much as $1/32$ " radius or $1/16$ " diameter, you can quickly tell where the blame should be placed.

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FLOATING HOLDER
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• WRITE FOR
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"Engineering Properties and Applications of Ni-Resist" is the title of a revised 36-page well-illustrated booklet now being offered by The International Nickel Co., Inc., 67 Wall St., New York 5, N.Y. Completely indexed, the booklet provides detailed information on the physical and mechanical properties of this widely used cast nickel alloy and also discusses performance under a wide variety of industrial conditions involving corrosion, heat, and wear. Corrosion data for 400 corrosive media are presented in tabular form. Copy free to executives.

American Vertical Hydraulic Surface Broaching Machines. A 12-page circular published by the American Broach & Machine Co., Ann Arbor, Mich., presents data on single ram, single dual, and duplex vertical hydraulic surface broaching machines which are manufactured in a full range of stroke sizes and tonnages to meet the various broaching requirements of the metal-working industry. Printed in three colors, the circular contains illustrations of actual broaching operations and machine features, and includes complete specifications for every model. Copy of Circular No. 300 free upon request.

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"A Man Friday" is the title of an eight-page pocket-size booklet published by the Bunell Machine & Tool Co., 1601 E. 23rd St., Cleveland 14, Ohio, in which M. O. Shepherd, works manager of the company, presents a new slant in a "Man Friday" engineering check-up for machine possibilities and their simplification. Copy free upon request.

Oilgear Small Transmissions. The Oilgear Co., 1352 W. Bruce St., Milwaukee 4, Wis., has published an eight-page bulletin illustrating and describing its line of small fluid power variable speed transmissions of up to 3 h. p. and with input speeds of up to 1,750 r.p.m. Dimensional diagrams of the various units are included in the bulletin, copy of which is available free by requesting Bulletin 67110.

Norton Mounted Wheels and Mounted Points. The Norton Co., Worcester 6, Mass., has prepared a 24-page pocket-size booklet which provides illustrated, descriptive, and tabular information, including prices, on the company's complete line of mounted wheels and mounted points which are made in sizes and shapes to meet all demands of industrial grinding requiring this type of product. Copy free upon request.

Oliver Precision Grinders. The Oliver Instrument Co., Adrian, Mich., now has available an eight-page catalog illustrating and describing 10 and 20-inch template tool bit grinders for high speed Stellite and tungsten carbide lathe-shaper-planer and special purpose template controlled tool grinding. Copy free.

Faster Tube and Pipe Cutting

STEEN High-Speed pipe, tube and column cut-off machines embody unique design and rigid construction features to greatly step up cut-off operations. Available in three sizes to cut diameters $\frac{1}{2}$ " to 3"; $\frac{1}{2}$ " to 6"; 3" to 12".

WRITE FOR CIRCULAR TODAY

CONTINENTAL MACHINE COMPANY

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Chicago 14, Ill.



Arc Welding Accessories. The Metal & Thermit Corp., 120 Broadway, New York 5, N. Y., has issued a 16-page bulletin which illustrates and describes a complete line of welding accessories, including cable connectors, cable lugs, cable splicers, cleaning tools, cover plates, eye shields, ground clamps, hammers, hand shields, helmets, holders, lenses, protective clothing, spectacles, and welding cables. Copy of Bulletin No. 120 free.

Sundstrand Model 4 Automatic Lathe for both the long and short-run turning of small parts is illustrated and described in an eight-page bulletin published by the Sundstrand Machine Tool Co., 2531 11th St., Rockford, Ill. Illustrations of typical turning jobs, tables of specifications, and dimensional drawings and data are included in the bulletin, copy of which is available free upon request.

Alox 162, a universal oil additive which is said to improve the lubricity of all types of lubricating oils and increase their life under high temperatures and high pressures, is the subject of a technical bulletin now available free from the Alox Corp., 3936 Buffalo Ave., Niagara Falls, New York.

Waukesha Tool Catalog No. 22. Published by the Waukesha Tool Corp., 1426 Aradian Ave., Waukesha, Wis., this 16-page catalog contains illustrated, descriptive, and tabular data on standard shank type adjustable reamers; standard shell type adjustable reamers; heavy duty shell type adjustable reamers; arbors; blades; wrenches; floating tap holders; quick-change chucks; and special tools. Copy free upon request.

"**Permanent Magnet Design,**" an article by Earl M. Underhill, is now being distributed in the form of a 28-page reprint by the Crucible Steel Company of America, 405 Lexington Ave., New York 17, N. Y. The article presents empirical data based upon practical experience and fundamental equations which take into account the many variables involved in the design of a permanent magnet for a particular job. Copy of the illustrated reprint is available free upon request.



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Save time and material in correcting screw machine stock lengths... use the KVE Micrometer stop. It pays for itself in a single run!

You can set this stock stop accurately to a thousandth of an inch after running only ONE piece.

Adaptable to all automatic and hand screw machines. Shank diameters: $\frac{5}{8}$, $\frac{3}{4}$, and 1 inch. Length, $5\frac{1}{3}$ ". Price now only 5.00, postpaid.

Start cutting costs—order by mail today! Write Dept. A.

Keene Valley
ENGINEERING CO.
Homer, N. Y.

A. G. Stock Gears and Sprockets. A 128-page pocket-size catalog and price list of stock gears and sprockets has been prepared by the American Gear & Mfg. Co., 5900 Ogden Ave., Chicago 50, Ill. Products covered include bevel, change, internal, intermittent, miter, non-metallic, spiral, spiraloid, spur, and worm gears; chain; sprockets; ratchets; worms; pawls; racks; and other items. Engineering data on standard keyways, set screws, circular pitch, diametral pitch, strength of gear teeth, and so on, are also included in the catalog.

Copy of Catalog and Price List No. 340 is available free to mechanical executives addressing requests on their company letterheads.

Simplex Jacks for supporting and leveling tanks are featured in an engineering data bulletin issued by Templeton, Kenley & Co., 1020 S. Central Ave., Chicago 44, Ill. Complete specification charts, selection guide data, and price listings on the supporting and leveling jacks are included in the bulletin, copy of which is available free by requesting Bulletin Tank 47.

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Complete stock of standard keys on hand for prompt shipment. Made from open hearth or alloy steel.

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Available in sizes 7/0 through 10 and lengths from $\frac{3}{4}$ inch to 6 inches. Others made to specification.

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Can furnish rack from almost any size blank and pitch as well as length to form continuous sections.

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PENNSYLVANIA

"**Metco News**" Vol 4, No. 1. Both production and maintenance applications of metallizing are presented in a recent issue of "Metco News," published by the Metallizing Engineering Co., Inc., 38 30th St., Long Island City 1, N. Y. Articles describe the blasting of grooves into dielectric panels and then spraying metal into them to furnish electrical circuits; the use of the "production metallizing machine" to put stainless steel on a cast iron chill roll, saving time and investment cost; making of major repairs with metallizing during scheduled shutdowns; and the spraying of a steel hull of a fishing vessel with a metal coating that has withstood two years' service from California to the Bering Sea. The use of metallized zinc for rust-resistance in the manufacture of freezer cold-plates, and the special Metcolizing heat resistance treatment of mechanical soot blowers are mentioned. Company research articles describe the sealing of lead coatings by shot blasting and the use of devices like a spring-backed tailstock center in a metallizing lathe. Copy free.

Relieved Type Lead-Screw Feed. A new development offering an economical method of producing precision threads at production speeds is described in a four-page two-color bulletin issued by Greenlee Bros. & Co., Rockford, Ill. The bulletin, illustrates and describes a new threading attachment and arrangement for Greenlee 4 and 6-spindle automatic screw machines which can be quickly interchanged with conventional equipment. Other advantages of the new development are clearly illustrated, with details presented of how machines now in use can be adapted to handle the attachment.

Copy of Bulletin A-401 is available free to individuals addressing requests on their company letterheads.

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METAL LATHERS' BENDER



This machine will bend up to $\frac{1}{2}$ " square or round iron, $2\frac{1}{2}'' \times \frac{1}{2}''$ channel iron, $2\frac{1}{4}'' \times \frac{5}{16}''$ flat iron cold. Weight 40 lbs.

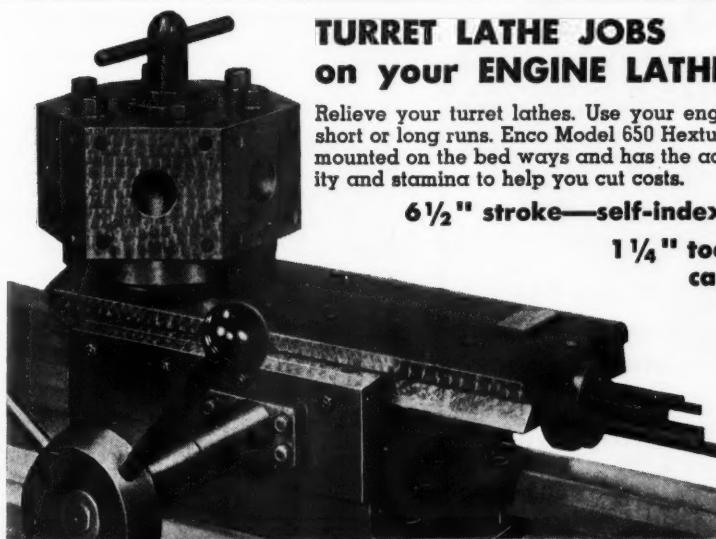
Circular on Request

317 EAST 47TH ST. NEW YORK CITY
Plaza 8-0380

U. S. Adjustable Multiple Spindle Drill Heads. The U. S. Drill Head Co., Cincinnati 4, Ohio, has published a catalog outlining its various adjustable multiple spindle drill heads. Shown in detail are the U-1 and U-2 adjustable heads for drilling, reaming, and tapping. Cross-section views of the complete heads are included to illustrate the various features and advantages of the heads. Copy free.

Merz "New - Matic" Measuring Machines. The exclusive "New - Matic" principle of air gage operation featured in the new line of Merz "New-Matic" Measuring Machines is fully explained in a 20-page booklet published by the Merz Engineering Co., 200 S. Harding St., Indianapolis 7, Ind. The booklet covers the five models of measuring machines available for all types of inspection requirements, as well as taper gages for checking both taper and out-of-roundness in a single operation. Data are also presented on a variety of high precision sorting and gaging machines for many different types of complex checking operations. Copy free upon request.

Cincinnati Machine Tool Booklet No. M-1613. Cincinnati Milling and Grinding Machines, Inc., Cincinnati 9, Ohio, is now offering a 106-page pocket-size booklet which contains illustrations and descriptions of the company's complete line of products, including 17 new design machines (plus two specials) exhibited at the recent Machine Tool Show. Concise data are provided on plain and universal milling machines, vertical milling machines, high speed dial type milling machines, automatic rise and fall milling machines, plain and duplex automatic milling machines, Hydromatic milling machines, special duplex concentric millers, 4-spindle 360-deg. automatic profilers, high speed vertical milling and depth control tracer attachments, tool and die milling machines, vertical Hydro-Tel die sinkers and milling machines, single ram vertical and duplex vertical Hydro-Broach machines, horizontal Hydro-Broach machines, cutter and tool grinders, Projecto-Form grinding machines, centerless grinding machines, centerless lapping machines, chucking grinders, plain hydraulic grinding machines, hydraulic universal grinding machines, and so on. Copy free to executives upon request.



TURRET LATHE JOBS on your ENGINE LATHE

Relieve your turret lathes. Use your engine lathes for short or long runs. Enco Model 650 Hexturret is quickly mounted on the bed ways and has the accuracy, rigidity and stamina to help you cut costs.

6 1/2" stroke—self-indexing

**1 1/4" tool hole
capacity.**

Ask for
catalog
and 650
chart.

ENCO MANUFACTURING COMPANY

Dept. 112, 4522-24 Fullerton Ave., Chicago 39, Illinois

Cadillac Cutters. Of prime interest to die and moldmakers, a circular on tapered end mills released by the Cadillac Cutter Co., 1611 Eastern Ave., S.E., Grand Rapids 7, Mich., includes a complete stock size table which not only lists the diameter at the bottom end of each tool in the line, but also the diameter at the top of the cutting flutes in 0.000 inch and the rise per side in 0.000 inch for the length of the flute.

Also, the company is offering a circular which presents illustrated, descriptive, and tabular information on a new line of 3-flute end mills in double-end styles. Copy of this circular, as well as the circular mentioned above, is available free upon request.

"Bench King" Vise. A four-page folder now available from Benjamin Uydess & Sons, Inc., 960 E. 167th St., Bronx 59, N. Y., illustrates and describes a solid bronze vise with tool steel fingers for use by toolmakers, instrumentmakers, gunsmiths, silversmiths, craftsmen, modelmakers, jewelers, metal workers, diemakers, templatemakers, and so on. Copy free upon request.

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wise to examine
our data sheets
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"Quality Stampings in Small Quantities" is the title of a four-page illustrated bulletin published by the Federal Tool & Manufacturing Co., 3212 N. Washington Ave., Minneapolis 12, Minn., which discusses the advantages and economy of using short-run metal stampings as produced by the above firm. Copy free upon request.

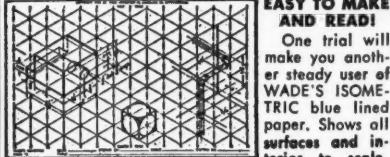
American Standards Price List. A 24-page price list of its 874 standards is announced by the American Standards Association. The booklet includes prices of standards which have been revised slightly upward because of increased production costs. A number of additional revised standards approved since the January 1947 issue of all American Standards are listed.

Copy of price list is available free of charge from the American Standards Association, 70 E. 45th St., New York 17, New York.

Empire Universal Spring Winder, a precision tool specifically designed to produce springs of all types—both open and closed styles—quickly, safely, and accurately, is illustrated and described in Bulletin ESW-10 now available free from Greene, Tweed & Co., North Wales, Pennsylvania.

Congress Drill Stands for holding complete sets of drills from $\frac{1}{16}$ to $\frac{1}{2}$ inch or Nos. 1 to 60 are illustrated and described in a circular prepared by the Congress Die Casting Div., Detroit 12, Mich. Special pulley assortments are also described in the circular, copy of which is available free upon request.

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Makes clear blueprints. Saves time daily in hundreds of plants. Write for Circular.

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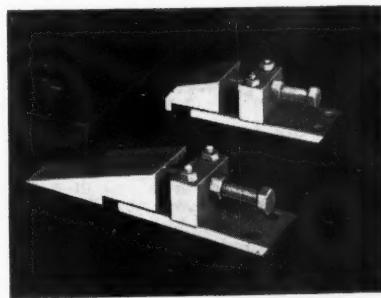
Fast Feed Open-Back Inclinable Press—featuring finger-tip variable control is illustrated and described in a four-page folder prepared by the Fast Feed Machine Corp., 215 Kunkle Bldg., Ashtabula, Ohio. A table of specifications of the 9, 10, 19, and 30-ton models in which the press is available is included in the folder, copy of which is available free.

Taylor-Winfield Non-Synchronous Co-ordinated Controls for resistance welders are fully illustrated and described in a four-page bulletin prepared by The Taylor-Winfield Corp., Warren, Ohio. Copy of Bulletin 10-213 free upon request.

Peerless Horizontal Belt Surfacing Machine for wet or dry operations on die castings, plastics, cast iron, steel, alloys, ceramics, and other materials is illustrated and described in a four-page bulletin released by The Production Machine Co., Greenfield, Mass. Specifications of the unit are included. Copy of Bulletin No. 10 free upon request.

Abrasive Model GC Circular Graduating Machine, designed to quickly and accurately graduate handwheels, dials, knobs, and similar parts used on machinery and other equipment, is depicted and described in a four-page bulletin released by the Abrasive Machine Tool Co., East Providence 14, R. I. A table of specifications and a chart showing the change gears to be used to obtain the required number of graduations are included in the bulletin, copy free upon request.

Wendt-Sonis Chip-Breaker Chart. A chart containing detailed drawings and information on the preparation of four types of chip breakers has been prepared by the Wendt-Sonis Co., Hannibal, Mo. Detailed drawings show how to prepare chip breakers for general use in continuous cuts on concentric workpieces; chip breakers for tools having a large nose radius for light or finishing cuts with maximum depth of $\frac{1}{8}$ inch; and parallel type chip breakers for cuts extending to 90-deg. shoulders or on eccentric workpieces. Included are tables showing recommended width of chip breakers and a grinding summary. The chart is of calendar style and is available free.



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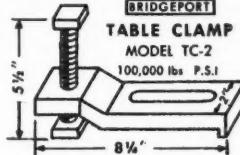
MODEL 100A—LIFT TO 500 LBS.

MODEL 100B—LIFT TO 4,000 LBS.

MODEL 100C—LIFT OVER 4,000 LBS.

HOLD LOW OBJECTS

Engineered for Production

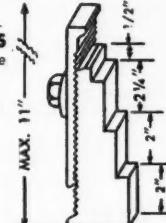


TURN



HOLD HIGH OBJECTS

Special Alloy Bronze



BRIDGEPORT

ADJUSTABLE STEP
LADDER BLOCK

Speed Up
Production
with these
3 New Tools

Sundstrand Model 22 Rigidmil, a $7\frac{1}{2}$ h.p. automatic milling machine, is fully illustrated and described in an eight-page bulletin published by the Sundstrand Machine Tool Co., 2531 11th St., Rockford, Ill. Complete dimensional drawings of the machine, together with corresponding tables, are included in the bulletin. Copy free upon request.

Mattison Grinding and Polishing Machines. The Mattison Machine Works, Rockford, Ill., now has available a six-page circular which illustrates and describes abrasive belt grinding and polishing machines which can be furnished in a variety of combinations, depending upon the type of work to be finished. These include a hand block type grinding and polishing machine, which can also be equipped with a hand lever stroke attachment and arranged for wet grinding; a hand-lever stroke type grinding and polishing machine for all manner of flat work; and an automatic stroke grinding and polishing machine with automatic power stroke for flat grinding. Typical installations of the machines are shown and described, and specifications of the various units are presented. Copy free.

"**The Toolmaker's Microscope . . . Versatile Tool of High Accuracy**" is the subject of a reprint now being distributed by the George Scherr Co., Inc., 198-A Lafayette St., New York 12, N. Y. The article points out various ways in which the instrument may be used throughout the shop and in inspection. It contains illustrations showing the Toolmaker's Microscope in actual use. Copy of reprint free.

CAMS

Our ROWBOTTOM cam cutting facilities are at your disposal for your cam requirements.

Let us have your inquiries.

BLOOMFIELD TOOL CORP.
37 FARRAND ST. BLOOMFIELD, N. J.

"**Clearing Away Misunderstandings**" is the title of a 12-page pocket-size booklet by M. O. Shepherd, Works Mgr., The Bunnell Machine & Tool Co., 1601 E. 23rd St., Cleveland 14, Ohio, in which Mr. Shepherd presents a discussion of standard versus special machines. Copy of the booklet is available free by writing direct to the above firm.

"**The Travels of Modern Lubrication**" is the title of a four-page bulletin published by the Bijur Lubricating Corp., Long Island City 1, N. Y., which illustrates and discusses the application of Bijur lubricating systems to bottling equipment, machine tools, juice fillers, printing presses, textile machinery, and so on. Copy of Bulletin NB-1 free upon request.

Blackhawk Torque Indicators. Six models of torque indicators with capacities of 50, 133, 175, 420, and 1,000 footpounds are illustrated and described in a four-page bulletin issued by the Blackhawk Manufacturing Co., Milwaukee 1, Wis. Specifications and prices of the various models are included. Copy of Bulletin 46-T free upon request.

"COOL-CUT"

THE COOLANT FOR TOUGH CUTS

ALL METALS AND ALLOYS

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\$1.00 BRINGS 10 GALLONS FOR YOUR TESTS

Money back if "Cool-Cut" does not do as we claim

COOL CUT Coolant Co.,

342 Madison Ave., New York 17, N. Y.

Greenlee Automatic Transfer Processing Machines. Facts concerning the development and use of Greenlee Automatic Transfer Processing Machines are presented and fully illustrated in an eight-page two-color bulletin published by Greenlee Bros. & Co., Rockford, Ill. The bulletin traces the early development of Greenlee Transfer Machines dating back to the year 1934 and is concluded with a description of several of the latest machines which are now being used by mass production industries. Photographs, production figures, and illustrated operation charts tell an interesting story of progress.

Copy of Bulletin SM-453 is available free to individuals addressing requests on their company letterheads.

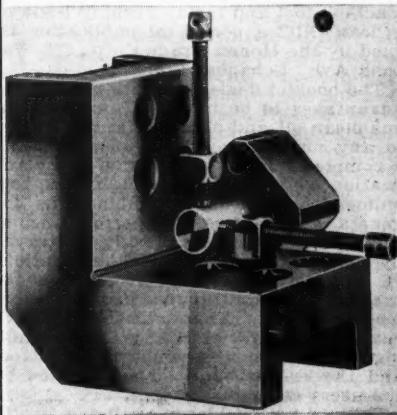
"Titan" Large Diameter Brass Rods are described in a four-page folder issued by the Titan Manufacturing Co., Bellefonte, Pa. Included are tables listing maximum lengths of rods in various diameters, composition of the alloys in which they are furnished, and A. S. T. M. and S. A. E. specifications for these alloys. Copy free.

"Lusol," a liquid concentrate for use in performing grinding, broaching, machining, drilling, boring, milling, sawing, threading, and other operations, is described and its various applications illustrated and discussed in a 12-page performance data book prepared by the F. E. Anderson Oil Co., Portland, Conn. Copy of Book AL-2 free upon request.

Alco Automatic Screw Machine Cams for Brown & Sharpe screw machines are described in an illustrated leaflet prepared by The Alco Tool Co., 152 Birds-eye St., Bridgeport 4, Conn. Tables giving dimensions and prices of the cams are included in the leaflet. Copy free.

Kloppenborg Brass and Aluminum Head Hammers for use by machinist mechanics and foundrymen where work must not be damaged or marred during driving are covered as to dimensions, weights, and prices in a circular now available free from the Kloppenborg Aluminum Foundry, 211 Marquette St., Davenport, Iowa.

SQUAR-IT CLAMPING BLOCKS



Save costly set-ups in holding small work. All surfaces ground square with their opposite and right angle faces . . . to assure a perfect job on removal from block. Square sliding clamps are fitted to broached holes for easy removal. Furnished with two long and two short sliding clamps. Screws have knurled heads with hex broached hole in end for wrench tightening. Blocks furnished hard or soft . . . Model H-4 or S-4.

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Also manufacturers of Drilling Plates and Radius Emery Wheel Dressers.

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& MACHINE CORP.**

ROCHESTER • NEW YORK

"Clean Oil" Special Issue. The complete story of cutting oil purification and coolant clarification, including an explanation of its tangible benefits, methods of application, data on specially designed equipment, and full particulars on typical operating installations, is fully and comprehensively presented in a special machine tool and metal-working issue of "Clean Oil," a periodical publication issued by the Honan-Crane Corp., 682 Wabash Ave., Lebanon, Indiana.

The booklet deals first with the general advantages to be realized from continuous clean oil and clean coolant operation in any machining job. It then presents a complete line of purification and clarification equipment and explains the recommended units and combinations for general applications. The performance of the equipment is graphically portrayed by detailed and diagrammed descriptions of currently operating installations in the plants of well known metal-working manufacturers. These "case histories" cover a wide variety of typical machining operations, the problems involved, and the results obtained as attested by the users of the equipment.

Copy of the booklet is available free to individuals addressing requests on their company letterheads.

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Manufactured by

**AUTO MOULDING
& MFG. CO.**

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Brown & Sharpe Automatic Pinion Turning Machine, product of the Brown & Sharpe Manufacturing Co., Providence 1, R. I., is covered as to features, advantages, specifications, and so on, in a four-page illustrated bulletin prepared by this firm. Copy free upon request.

Heald Model 271 and 371 Chuck Type Internal Grinding Machines, designed for the high production precision grinding of small to medium-large holes are shown and described in a four-page bulletin issued by The Heald Machine Co., Worcester 6, Mass. Also presented are complete specifications of the machines. Copy free.

Square D Digest. A 76-page digest which is designed to serve as a valuable source of reference and information on Square D equipment manufactured by both the Switch and Panel and the Industrial Controller Divisions of the company has been prepared by the Square D Co., 6060 Rivard St., Detroit 11, Mich. The catalog includes size, capacity, and dimensional data, together with current prices.

Although not all-inclusive in its coverage of the Square D line, the catalog lists the Detroit Division's industrial safety switches, service equipment, multi-breakers, industrial circuit breakers, square duct, Saflex plugin and feeder duct, and lighting and power panelboards. Milwaukee Division products covered include a wide range of basic and related industrial motor control devices, as well as a complete line of pressure, float, and vacuum switches for water pump control. Also contained in the digest are convenient tables for quick reference in the proper selection of devices. Copy of Digest No. 130 free to mechanical executives upon request.

PRESSES
FEEDS
AUTOMATIC
EQUIPMENT

The V & O Press Company, Incorporated
HUDSON, NEW YORK

American Vertical Hydraulic Press. Circular No. 202 illustrating and describing the American Type V-1 Two-Ton Vertical Hydraulic Press for arbor press work, assembly work, straightening, and push broaching operations is now being distributed by the American Broach & Machine Co., Ann Arbor, Mich. Printed in three colors, the circular includes a table of specifications. Copy free.

Cleveland Model AB "Dialmatic." a 2½-inch single-spindle 5-hole turret automatic which is equipped with an electric feed drive and can be used either as a bar machine or as a chucker, is illustrated and described in a six-page bulletin now available free from The Cleveland Automatic Machine Co., 4940 Beech St., Cincinnati 12, Ohio.

AO Optical Projection Comparator, a basic instrument which can be used either on a bench or its own pedestal and which is said to be adaptable to all uses either for the inspection of production pieces or as a microscopically precise measuring device, is illustrated and de-

scribed in a six-page folder now being distributed by Engineers Specialties Division, The Universal Engraving & Color-plate Co., Inc., 980 Endicott St., Buffalo 8, N. Y. Copy free upon request.

Cleveland Model 200 Universal Die Casting Machine for zinc, tin, or lead casting, as well as for aluminum, brass, or magnesium casting by changing the hot metal end, is illustrated and described in a bulletin prepared by The Cleveland Automatic Machine Co., 4940 Beech St., Cincinnati 12, Ohio. Complete specifications of the unit are included. Copy free upon request.

Digest of Articles on Diamonds. The Industrial Diamond Information Bureau, Industrial Distributors, (1946) Ltd., St. Andrew's House, 32-34, Holborn Viaduct, London, E.C.1., England, is now publishing a monthly bulletin containing abstracts of articles dealing with properties and industrial applications of diamonds, together with notices of patents and patent applications in many states. Copy free upon request.

● Simplicity in design, rigid construction, accuracy, and ease of operation are outstanding features of Nebel Lathes. They possess all the latest improvements including Timken Bearings—Self Oiling Headstock—Chrome Nickel Shafts—Quick Change Gear—Double Wall Self Oiling Apron—Quick Action Apron Levers—Thread Chasing Dial. Write for complete information.



Lincoln Engineering Undergraduate Award and Scholarship Program. Rules and conditions for entering the annual engineering undergraduate award and scholarship program sponsored by The James F. Lincoln Arc Welding Foundation, Cleveland 1, Ohio, and closing May 15, 1948 are presented in a 28-page booklet now available free from the Foundation.

"Annealing in 'Surface' Standard Rated Furnaces" is the title of a four-page bulletin issued by the Surface Combustion Corp., Toledo 1, Ohio. The bulletin, appropriately illustrated, defines the various annealing and related processes for both ferrous and non-ferrous metals. A critical temperature chart showing in color normalizing, full annealing, spheroidizing, and process annealing ranges and photomicrographs of annealed low, medium, and high carbon steels are included. The bulletin describes and contains illustrations of both direct fired and prepared atmosphere furnaces. It also contains a chart showing the amount of gas saved by correct proportioning of the air-gas ratios for combustion. Copy of Bulletin No. SC-135 free upon request.



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Cuts straight and irregular shapes faster—
better! Order No. 1 for 14 ga. (with High Carbon, High Chrome Blades for 18 ga.); No. 2 for 10 ga. (with H.C.H.C. blades for 14 ga.); and No. 3 for $\frac{1}{8}$ " mild steel or 10 ga. stainless. Write for catalog!

THE BEVERLY SHEAR MFG. CO.
3004 W. 111th St., Dept. 3, Chicago 43, Ill.

Economy Precision-Made Tools. The Economy Tool & Machine Co., 1829 S. 68th St., Milwaukee 14, Wis., has prepared an attractive 48-page plastic-bound catalog regarding its precision-made tools for industry. Beginning with an introductory and plant views of the company, the catalog then presents list prices and information on A.S.A. Standard drill jig bushings, including slip renewable bushings; headless liners, fixed renewable bushings; headless press fit bushings, and head press fit bushings; new steel, new chrome plated gages, including plug gages, cylindrical ring gages, and master setting discs; American Gage Design Standards for plain plug and ring gages and recommended designs for flat plug gages; and salvaged gages (by hard chrome plating), including plug gages, cylindrical ring gages, and master setting discs. Designing and purchasing information is included for all products treated.

Copy of the catalog is available free to mechanical executives addressing requests on their company letterheads.

Abrasive No. 5 AWF Internal Finisher for grinding dies, gages, bushings, and similar parts of carbide and other materials is fully illustrated and described in a four-page bulletin prepared by the Abrasive Machine Tool Co., East Providence 14, R. I. Complete specifications of the unit are included in the bulletin. Copy free.

Production Sine Bar, Sine Plate, and Sine Center for use in layout work, in machining, and in checking are featured in a four-page bulletin prepared by the Production Tool & Die Co., Inc., 572 St. James Ave., Springfield, Mass. Each piece of equipment is individually illustrated and described and a particular application shown. Copy free upon request.

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PROMPT DELIVERY
UP TO 12" DIAM. - 3 D. P.
CUTTING ONLY or COMPLETE GEARS
LATEST GLEASON EQUIPMENT



Greaves MACHINE TOOL CO.
89 2015 Eastern Ave.
Cincinnati, Ohio

"Thread Grinding," a 36-page handbook for operators of thread grinding machines, has been published by the Norton Co., Worcester 6, Mass. The information contained in the book has been compiled from the company's experience in the course of establishing the proper specifications of grinding wheels and covers separately two distinct types of thread grinding operations; namely, the single rib and multi-rib. Copy free to executives.

LeBlond Model RT 16-Inch Toolroom Lathe, which provides over 300 speeds ranging from 6 to 1,500 r.p.m., is fully illustrated and described as to construction features, advantages, operation, and so on, in a six-page bulletin published by The R. K. LeBlond Machine Tool Co., Dept. MMS, Cincinnati 8, Ohio. A table of specifications is included. Copy of Bulletin RT-30 free upon request.

Marshall Precision Ground Flat Stock. Marshall Steel, Dept. MMS, Box 58, Lisle, Ill., has prepared a four-page folder which contains illustrated, descriptive, and tabular data, including thicknesses, sizes, weights, and prices, on velvet finish precision ground flat stock for use in the production of dies, jigs, gages, fixtures, shims, liners, bases, bolster plates, parallels, straightedges, ruling stock, shear blades, cams, ratchets, machine parts, special tools, and other products. Copy free upon request.

LeBlond Electric Contouring Device for duplicating work between centers or profile facing is illustrated and described in Bulletin EC-1 now available free from the R. K. LeBlond Machine Tool Co., Dept. MMS, Cincinnati 8, Ohio.

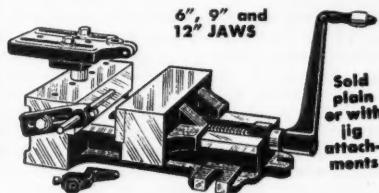
Pond Production Operator "200," an attachment for feeding bar stock to milling machines, grinders, and so on, is covered as to advantages, specifications, operation, and features in a four-page illustrated bulletin published by the Production Tool & Die Co., Inc., 572 St. James Ave., Springfield, Mass. Data are also provided on the Pond Operator Model "600" for secondary operations such as drilling, countersinking, tapping, and milling. Copy free upon request.

Take a look at this book

REQUEST
BULLETIN 41



GRAHAM MULTI-PURPOSE VISE



The above booklet illustrates in detail how this versatile vise provides square, V and shell jaws and stops to accurately position a wide variety of shapes, plus numerous attachments for drill and tool guiding. Here is a ready-made jig or fixture for repeat-operation work on drill press, radial, miller, planer, shaper, grinder. Sizes to 124 lbs.

"Adjust-angle" KNUURL HOLDER

Many
patterns
using only
straight
knurls



The above booklet contains full details of prices and work capacity, dimensions, patterns, etc., applying to this famous Knurling Tool which fits lathe turret or tailstock. Graduated scale permits guide adjustment of straight knurls to various positions for various straight, spiral or checkered patterns. Capacity up to 2½" dia.

For prices and details
request Bulletin 41

Graham Mfg. Co.

38 BRIDGE ST. EAST GREENWICH, R. I.

Vimco Machine Lights. A four-page folder now available from the Vimco Manufacturing Co., Inc., 111 Brayton St., Buffalo 13, N. Y., illustrates and describes a line of general machine lights for localized incandescent high-intensity lighting. Six standard models, as well as interchangeable parts for special lights, are shown, with ordering information clearly presented. Copy of Folder No. 74 free.

management problems at 24 national management conferences during the past two years and the special research reports of the Association on subjects of broad interest to all categories of management. In pamphlet form, the list is available without cost.

"**Progress in Scientific Management—1945-47**" is the title of a check list of publications reporting progress in business and industrial management since the end of World War II in personnel and industrial relations, office management, production, marketing, financial management, insurance, packaging, and general management. Published by the American Management Association, 330 W. 42nd St., New York, N. Y., the list is a guide to summaries and reports to the Association by more than 500 operating executives and specialists in all aspects of business and industrial management. Included in the list are the full text of the proceedings of panel and group discussions of

Gulf Hydraulic Oil. The influence of hydraulic oil on the efficiency of hydraulic machines is briefly explained in a folder issued by the Gulf Oil Corp., 3800 Gulf Bldg., Pittsburgh, Pa. The folder also outlines the functions and characteristics of Gulf Harmony Oil for the various requirements of hydraulic service. Copy free upon request.

"**Alcoa Temper Designations for Cast and Wrought Products**" (effective on all shipments made on or after January 1, 1948) is the title of a 16-page pamphlet published by the Aluminum Company of America, Pittsburgh 19, Pa. Copy free to mechanical executives upon request.

The advertisement features a large photograph of a motorized Brown & Sharpe Universal Grinder. Several callout arrows point to specific components: "SPEED INDICATOR" points to a small dial on the side; "SPEED CHANGE HAND WHEEL" points to a larger wheel above it; "BELT GUARDS" points to a safety device on the right; and "BELT TENSION KNOB TO CHANGE BELT FROM DEAD CENTER TO CHUCK WORK" points to a knob on the left. To the right of the grinder, the text "SCHULTES" ... The King of Motor Drives! is displayed in a stylized font. Below this, the text "For External and Internal Grinding Machines" is followed by a list of benefits: QUIET SHOCKLESS OPERATION, LOWER MAINTENANCE COST, ADDED FLEXIBILITY, GREATER SAFETY, and MORE POWER. At the bottom, the text reads: "No. 2 Brown & Sharpe Universal Grinder motorized with Schultes Motor Drive Equipment". The company name "SCHULTES TOOL & ENGINEERING CO." and address "3377 Gratiot Ave., Detroit 7, Mich." are prominently displayed at the bottom.

Lyon - Raymond Portable Hydraulic Elevating Tables are featured in an eight-page bulletin announced by the Lyon-Raymond Corp., 3957 Madison St., Greene, N. Y. In addition to providing full descriptions of the various models of elevating tables available, the bulletin contains illustrations showing the tables in actual use for die handling, strip and sheet feeding, work positioning, loading trucks, and other jobs. The features of the tables are clearly set forth in descriptive copy supplementing the illustrations. Copy of Bulletin 231 free upon request.

"BUR-ology" is the title of a 36-page pocket-size booklet published by Pratt & Whitney, Division Niles-Bement-Pond Co., West Hartford 1, Conn., concerning the uses and abuses of burs and the important place they have come to occupy in American industry. Copy free.

Ajax - Northrup Induction Heating Equipment for forging, upsetting spinning, hardening, and so on, is illustrated and described in a 12-page bulletin now available from the Ajax Electrothermic Corp., Ajax Park, Trenton 5, N. J. The bulletin includes data on the principles of induction heating, advantages, sources of power, furnace controls and auxiliaries, types of induction heaters, typical coils, and work stations. Also illustrated are many applications of induction heating. Copy of Bulletin 13-A free.

Cleveland Model 400 Universal High Pressure Hydraulic Die Casting Machine for zinc, tin, or lead is covered as to construction features, applications, specifications, and so on, in a four-page illustrated bulletin released by The Cleveland Automatic Machine Co., 4940 Beech St., Cincinnati 12, Ohio. Copy free upon request.

Shakeproof Precision Stamped Gears. Catalog S-45 published by Shakeproof Inc., 2501 N. Keeler Ave., Chicago 39, Ill., is devoted specifically to precision stamped gears and the many modifications available from existing dies. Copy free.

SCHERR aids to precision - production

THE COMPARITOL

Where inspection accuracy to "Tenths" and better is absolutely essential in such parts as gages, threads, fine wires, cylindrical ground work, etc., the Scherr Comparitol will give indisputable results. It can be used by anyone with a few minutes' instruction, can be placed near machines for constant spot inspection, as well as used for final inspection. Long-lived patented knife-edge mechanism needs no oiling, has no gears, racks, multiple levers, pivots or bearings, no electrical connections, bulbs or transformers. Thousands in profitable use.



SCHERR DIAL INDICATORS



With clamp holder, extension bar, tool-post holder, in compact metal case.

Last longer and cost less. Have an exclusive mechanism of extra sturdiness, with only three moving parts. No quick spinning wheels nor unhardened racks. Furnished with standard back or with ball-joint back for setting at any angle. Contact points for all needs.

ATLANTIC ADJUSTABLE LIMIT SNAP GAGES



Made in strict accordance with American Gage Design Committee specifications. Frames of Meehanite. Wide range of sizes, from .195 to 1 1/8". With round or square gaging pins, solid anvil, extended anvil, etc. The last word in snap gages, and at most interesting prices. Write us for details—and also about the Scherr special service for trueing and setting worn gages.

Write for full details on these tools, and for the Scherr Small Tool Catalog.

GEO. SCHERR CO., Inc.

198-A Lafayette St. New York 12, N.Y.

Davis "Wizard Toolrak" Blocks. A six-page folder prepared by Vanco Products Inc., P. O. Box 448, Colorado Springs, Colo., presents illustrations, together with tables and descriptive data, relative to standard styles of interchangeable sliding wood blocks for tools which can be removed and replaced in the aluminum back strip with a minimum of effort. Price information on the blocks is also included in the folder, copy of which is available free upon request.

Blackhawk Wrenches. The Blackhawk Manufacturing Co., Milwaukee 1, Wis., has prepared a 36-page catalog presenting illustrated, descriptive, and tabular information on its complete line of socket, open end and box type wrenches, specialties, and service tools and featuring the new "Nugget" socket wrenches with double-duty drive. Copy of Catalog No. 247 free upon request.

U. S. Multi-Slide Machines for the fabrication of precision parts from coil stock are illustrated and described in a 16-page bulletin released by the U. S. Tool Co., Inc., Ampere (East Orange), N. J. In-

cluded in the bulletin are specifications for the four sizes of Multi-Slides available, as well as illustrations and descriptions of special attachments and auxiliary equipment. Copy of Bulletin No. 15 free upon request.

"**Selecting a Drawing Compound**" is the title of a special feature article appearing in Vol. XXXI, Nos. 7-8 of "Oakite News Service," publication of Oakite Products, Inc., 136 Thames St., New York 6, N. Y. The article discusses the various contributing factors in making intelligent selection of a drawing compound after all the data on types and thickness of the metal to be worked, annealings, die design, speeds and pressures, depth of the draw, and so on, have been carefully evaluated. Such drawing compound desirables as cohesion and adhesion, film strength, proper degree of lubrication, and wetting-out characteristics are described in detail.

An interesting feature incorporated in the article is a chart showing actual instances where Oakite lubricants have been successfully used in typical drawing operations. The chart is arranged to show in each case cited the type of metal involved, its thickness, the depth of the draw, the object being fabricated, and the specific lubricant mixture employed in each operation. Copy of the issue of "Oakite News Service" containing the article is available free upon request.

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"EDUCATED DIAMONDS"
Can't Come Loose
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Hobart Multi-Range Arc Welders. The Hobart Bros. Co., Box DM 748, Troy, Ohio, has prepared a four-page folder which illustrates and describes the company's line of multi-range arc welders which include models and sizes for practically every welding requirement. Copy free upon request.

"SKELTON" TAPER REAMERS



Two cutting edges ground radial on a taper to correspond with hole reamed. Two opposite edges are "backed off" enough to allow for proper thickness of chip. This "safety edge" prevents blade from "hogging in" or "chattering." Standard tapers in stock. Specials to order.

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ONONDAGA TOOL CORPORATION

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Announcing the New... 10 inch *Atlas* TILT/ARBOR SAW

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The NEW Atlas 10-inch Tilt/Arbor floor saw is engineered and built to exacting standards . . . for easier, more accurate sawing, and greater output.

Blade alignment is *permanent* — heavy cradle and saw arm turn on two massive trunnions that are bolted and *doweled* to the table. Table top is precision ground — edges are machined so extensions may be added to either side. Arbor turns on precision ball bearings. Blade tilt and height controls are easy-acting for fast setup.

Unique rip fence has two ball bearings on rear fence rail for fast, smooth positioning. Fence is self-squaring, with provision for maintaining perfect alignment — releases instantly for removal or positioning on either side of blade. Locks securely at *both* ends for absolute rigidity.

This new Atlas saw is built to the same precision standards as Atlas metal working tools — built for accurate, efficient production — at low cost. Ask your Atlas distributor, or send for free bulletin today.

ATLAS PRESS COMPANY

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YOU GET ALL THIS WITH THE NEW ATLAS

- 27½"x27½" table — with 13¼" working surface ahead of blade, 19½" to the right, 8" to left.
- Cutting depth: 3⅓".
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 - Blade tilts to 45°—locks rigidly at any height or angle.
 - Sealed, precision ball bearings for permanent smooth operation.
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 - Exceptional ease of operation.
 - Massive construction — 262 pounds, without motor.



A.M.A. Production Series Booklets. The American Management Assoc., 330 W. 42nd St., New York 18, N.Y., has issued several additional booklets in its Production Series. Booklet No. 163, entitled "Management Techniques for Increasing Labor Productivity," contains articles on "Economic Considerations for Production Executives," "Labor Productivity and Technological Advances," and "What Is a Fair Day's Work?" It is available at a price of 75 cents per copy.

Booklet No. 164, entitled "Quality and Expense Control," is available at a price

of 50 cents per copy and contains articles on "Use of Pallets in Manufacturing," "Reappraising the Quality Function," and "Control Over Indirect Labor and Material Expenses."

Booklet No. 165, "Getting and Using Employees' Ideas," presents the following articles: "Why a Suggestion Plan?", "Suggestion Plans—The Value to the Personnel Relations Program," "Suggestion Statistics," "Building a Suggestion Program," "Training or Educating Imagineers," and "The Illinois Central Suggestion System." It is available at a price of 50 cents per copy.

Booklet No. 166, "The Foreman—The Job and The Man," can be obtained at a price of 50 cents per copy and presents articles on "The Foreman—The Job and The Man," "Labor Relations Tools for Foremen," and "Incentive Compensation for Foremen."

Booklet No. 167 is entitled "Human Relations Opportunities for Management" and presents articles entitled "Human Relations Opportunities for Management," "A Production Improvement Program for Management," and "The Future of Industrial Training." The booklet is available at 50 cents per copy.

Booklet No. 169, "Production Policies for Increased Output," contains the following articles: "Increasing Labor Productivity," "The Economic Justification for Investment in Plant Assets," "Incentive Plans vs. Measured Day Work," and "Incentive and Work Standard Grievances." Price, 75 cents a copy.

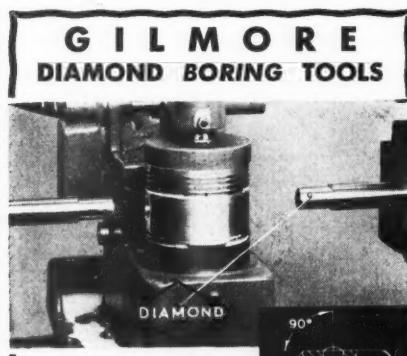
Booklet No. 170, entitled "The Human Aspects of Methods Improvement," contains articles on "Workers' Attitudes Toward Cost Reduction and Methods Improvement," "Getting Supervisors' Cooperation in Methods Improvement," "Sound Compensation for Foremen," "Freedom to Manage," and "A Labor Leader Looks at Management's Effort to Lift Output." It is available at a price of \$1.00 per copy.

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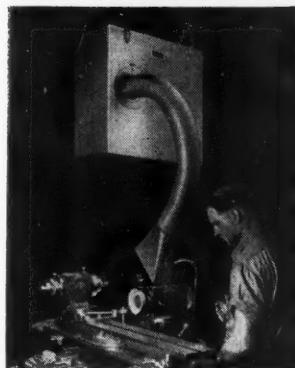
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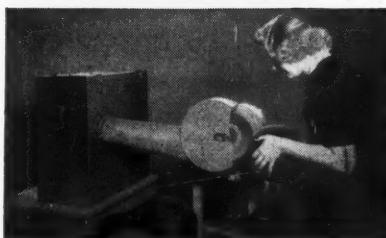
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One of the highlights of the book is a newly-developed precalculated foot-candle table which covers seven pages. By using this table, lighting men can predict easily and accurately the results to be obtained by most any type of interior lighting installation with a minimum of mathematics. Each chapter is numbered separately and a "quick find" index in the form of labeled tabs is provided. In addition, the book includes a four-page subject index where references are by chapter and page.

Published on a $7\frac{1}{2}$ x $4\frac{1}{4}$ -inch page size, the Westinghouse Lighting Handbook is bound in a flexible leatherette cover with a Wiro binder, and is available at a price of \$2.00 per copy from the Advertising & Sales Promotion Dept., Westinghouse Lamp Div., Bloomfield, N. J.

"Management's Internal 'Public' Relations" is the title of a 42-page booklet, designated as Personnel Series No. 102, which is now being distributed by the American Management Assoc., 330 W. 42nd St., New York 18, N. Y. The booklet contains articles entitled "Does Management Get Its Message Across to Employees?", "Time Out for Briefing—I," "Time Out for Briefing—II," and "The Status of Personnel Administration in Management."

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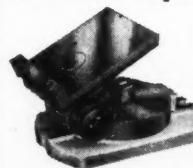
Prints of the film are available on a loan basis to interested technical groups. Those desiring to view the film should write direct to Greenlee Bros. & Co., Rockford, Ill., on a company letterhead, stating the approximate date the film is desired and estimated number of persons who will view the film.

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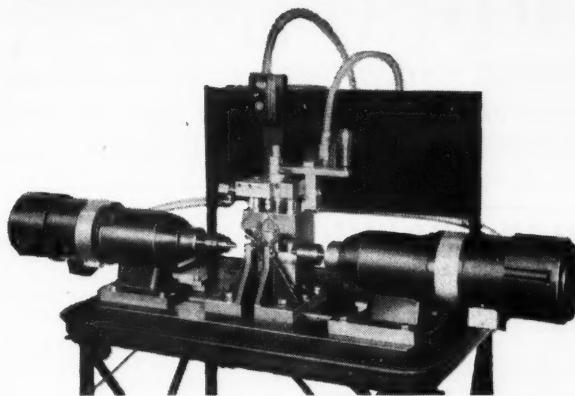
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The film is available without charge from the Film Section, Westinghouse Electric Corp., 511 Wood St., Box 868, Pittsburgh 30, Pennsylvania.

Magnesium Film

Available from The Dow Chemical Co. on a free loan basis are three informative and entertaining movies on magnesium. The first is "The Working of Magnesium," a 16 mm. sound picture which runs for 27 minutes and portrays various techniques for handling the metal, such as machining, forming, arc and spot welding.

"This Is Magnesium" is a film of a general nature, showing the extraction of the metal and magnesium's vast possibilities as a structural material. Running time for the 16 mm. sound picture is 20 minutes.

A new Walt Disney 16 mm. sound cartoon in technicolor is "Treasure From the Sea" which shows the values of magnesium to industry. This 16-minute cartoon will be sent with "This Is Magnesium" unless otherwise specified.

These films are available by contacting Millard J. Hooker, Advertising Dept., The Dow Chemical Co., Midland, Michigan.

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Over the Editor's Desk

The Friendship Train

As we go to press the "Friendship Train" has finished its trip across the country from coast to coast focusing the attention of the American people upon the plight of Europe—which was the objective. The questions now in the minds of everyone who is giving thought to the matter are (1) Should we deprive ourselves in order to help the European people; (2) How much aid will Europe need before it will be able to take care of itself again, and (3) How much cooperation can we expect from the European people, themselves?

In the first place, we must consider that for many years Europe was a battlefield, and that the ravages of war have left the European countries in a state of ruin. The people are destitute, without clothing and without food. Regardless of the causes, we cannot continue to call ourselves a Christian nation unless we make every effort, even to depriving ourselves, to give them the aid and succor which they so desperately need.

However, in bending to the task of helping the nations across the water, let us not lose sight of the reasons why we here in America are able to render this aid. As Harvey S. Firestone, Jr., said in an address recently; "Some of the countries now asking for help were great powers long before the United States became an independent nation. Yet in the relatively short span of 171 years we have overcome their headstart of centuries and have become the most prosperous, the most powerful and the most successful nation on earth.

"How did this happen? . . . The answer is four-fold. First, Mother Nature endowed us with tremendous resources. Second, we had no powerful neighbors to threaten our security. Third, we adopted at the start and developed down through the years a better system of government. And, fourth, we created an economic system which brought to us a better way of life. . . Yes, this is the land of opportunity, where such qualities of character as diligence, foresight and ability are much more vital to success than noble birth, tradition and force.

"And so, it is no wonder that despairing people in other lands cast longing eyes at us and wish with all their hearts that they, too, had the material possessions, the political liberties and the sociological advantages which we Americans enjoy. But . . . instead of adopting eagerly a system which has proved successful, some of them waste their time and our money in futile experiments with social doctrines which have failed miserably in the past.

"In places where such social experiments have been tried, they have merely succeeded in reducing the standard of living. Over here, America has sought to better the lot of her people by fostering individual initiative through a system designed to produce a higher standard of living.

"Today, Americans look at conditions in many other countries, where starvation, poverty and tyranny rule supreme, and they see nothing to be gained and much to be lost by changing to any other social doctrine. There are countries which call themselves democracies where a citizen may not own land or select his own job. He may not be tried by a jury of his peers. He may not stay away from work without permission or without good and sufficient reasons. He may not strike or join a picket line. He may not employ anyone to work for him. He does not have freedom of speech, freedom of assembly or freedom of religion and his press and radio are censored by his government. If he shows any tendency toward friendliness with a foreigner, the secret police watch his every move and he may be imprisoned or even executed.

"A century ago, thousands of families left their homes east of the Alleghenies and braved the unknown wilderness in search of fortune. They knew before they started that thirst, hunger, exposure and savage enemies were obstacles which they would have to overcome before they could span the continent and reach their goals. Did these hardships stop them? Not for a minute! They knew that anything worthwhile can be gained only by taking risks, by hard work and by determination. Most Americans still believe in that creed. America is **not** getting soft. Like the hardy pioneers who defied the hazards of the trail, Americans know that you have to **give** in order to **get**.

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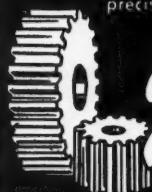
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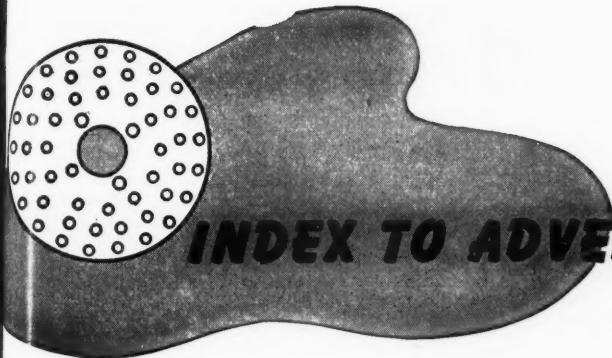
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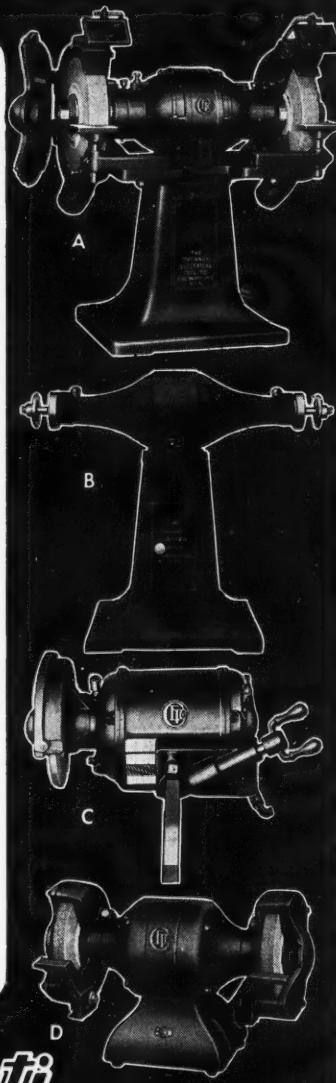
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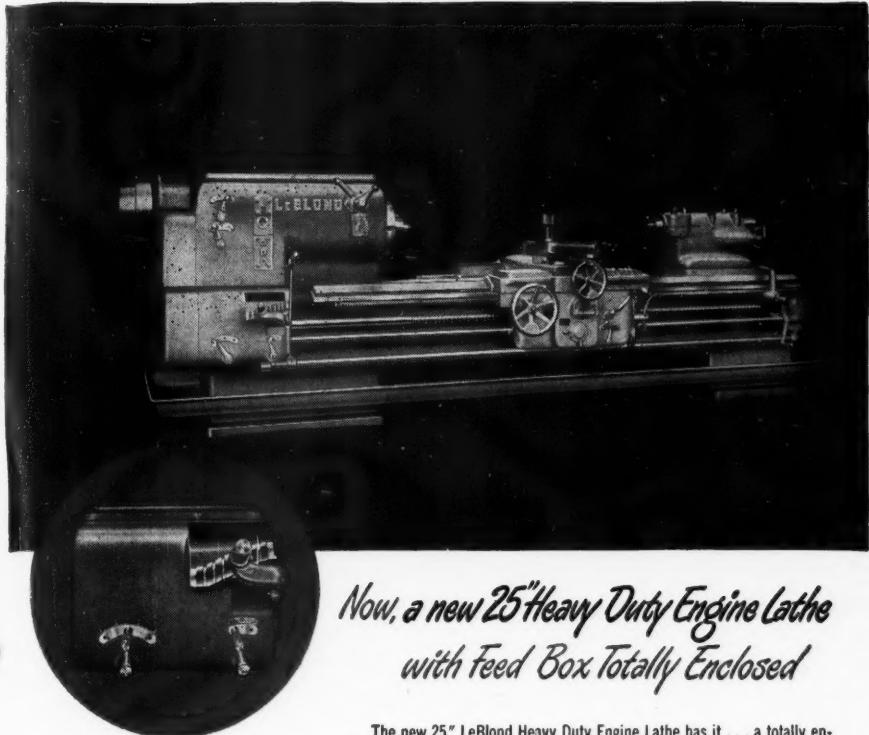
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Now, a new 25" Heavy Duty Engine Lathe with Feed Box Totally Enclosed

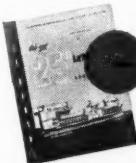
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The new 25" LeBlond Heavy Duty Engine Lathe has it . . . a totally enclosed, automatically lubricated, quick change box. Gears are inside a protective, oil-tight casting which chips and other abrasive matter positively cannot penetrate. Clean, filtered oil supplied continuously, automatically.

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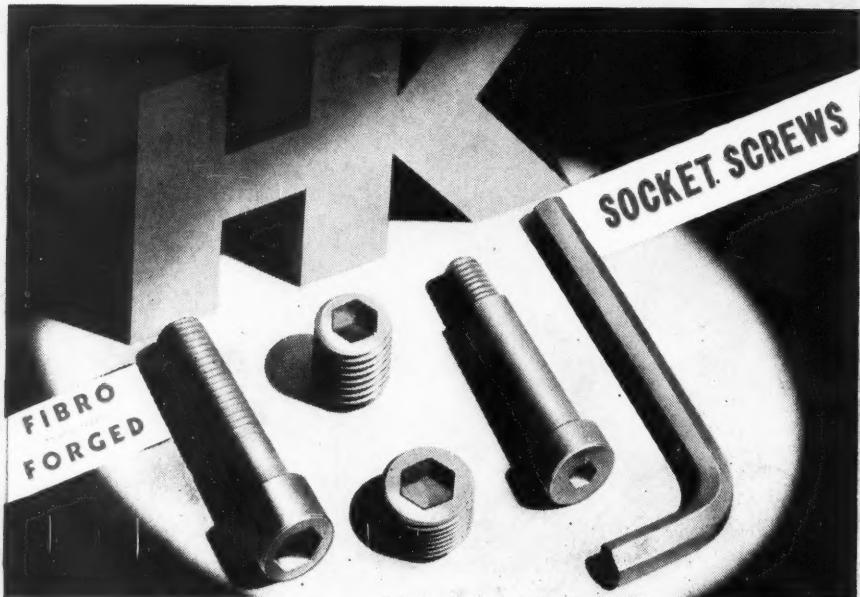
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